MODEL 605

SYNTHESIZED MICROWAVE

SIGNAL GENERATOR

6063R-F

Giga-tronics
INCORPORATED

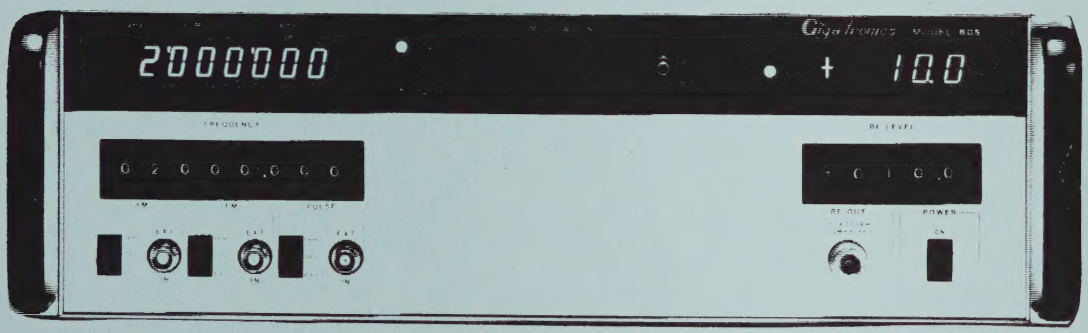
BEN GOLDSMITH
PROGRAMMER
THURSDAYS ONLY

OPERATION & MAINTENANCE MANUAL

MODEL 605

SYNTHESIZED MICROWAVE

SIGNAL GENERATOR



This manual applies to all Series 605 instruments. For information regarding instrument configuration and options, see page iii.

Shipping Assembly Part Number: see page iii.

Manual Part Number: 308AM00400

Print Date: December, 1988

2495 ESTAND WAY • PLEASANT HILL, CALIFORNIA 94523 • PHONE (415) 680-8160

WARRANTY

All Giga-tronics instruments are warranted against defective materials and workmanship for one year from date of shipment. Giga-tronics will at its option repair or replace products that are proven defective during the warranty period.

This warranty DOES NOT cover damage resulting from improper use, nor workmanship other than Giga-tronics service.

There is no implied warranty of fitness for a particular purpose, nor is Giga-tronics liable for any consequential damages.

Specification and price change privileges are reserved by Giga-tronics.

NOTE:

This manual employs the convention of indicating exponents by a capital 'E' (for example, 10E4 = 10000, and 6 X 10E-3 = .006).

SERIES 605 CONFIGURATION DATA

SHIPPING ASSEMBLY NUMBERS

This operation and maintenance manual is valid for all Series 605 instruments. The instruments in the series differ primarily in their frequency ranges, which are indicated by a suffix in the model number. Each instrument contains a frequency assembly appropriate to its frequency range. For instruments which include the .01-2 GHz range, see Section 9 (Special Configurations).

Model	Shipping Assembly#	Frequency Assembly#
605/2-8	308DA00500	304CA08600
605/6-12	308DA00501	304CA08603
605/10-18	308DA00502	304CA08602
605/6-18	308DA00506	304CA08605
605/.01-8	308DA00503	304CA08604

OPTIONS, SPECIAL CONFIGURATIONS, MODIFICATIONS

Consult the "Config." line on the Model/Serial/Config. sticker affixed to the rear panel of the instrument. If this line is blank, there are no options installed in the instrument. If the line contains one or more two digit numbers (e.g., '06') the standard options corresponding to those numbers are installed in the instrument. Information concerning them will be found in Section 8 of this manual.

If the "Config." line of the Model/Serial/Config. sticker contains a three digit number (e.g., '052') there is a combination of standard or special options, and/or special modifications, installed in the instrument. Information concerning them will be found in Section 9 of this manual.

SERIAL NUMBERS

This instrument has a six digit serial number. The first two digits are a prefix indicating instrument type (single band instruments such as the 605 are signified by the following prefixes: 41, 42, 43, 44, 45, 46, 47, 48, 49, 60, 61, and 62). The last four digits are a sequential suffix.

MANUAL CHANGES

Differences may exist between the manual and the instrument for which it is supplied, owing to printing errors or circuit changes. These differences are described in a supplement (Section 10), with reference to individual instruments by serial number.

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GENERAL INFORMATION

In addition to the front matter presented here, this manual contains ten sections which describe various aspects of Series 605 synthesized microwave signal generators:

SECTION ONE -- Operating Information

This section is a user's guide to the instrument and its controls.

SECTION TWO -- Performance Specifications

The instrument's performance parameters are specified in this section.

SECTION THREE -- Theory of Operation

This section provides a description (at the block diagram level) of the Series 605 and its method of operation, offered as an aid to understanding for the purpose of maintenance and applications.

SECTION FOUR -- Calibration and Testing

Procedures for inspection, calibration, and performance testing are outlined in this section.

SECTION FIVE -- Maintenance

This section presents step-by-step procedures for maintenance and troubleshooting.

SECTION SIX -- Parts Lists

This section provides complete lists of all parts and their sources.

SECTION SEVEN -- Diagrams

This section provides schematic diagrams, descriptions, and parts placement diagrams for all circuits.

SECTION EIGHT -- Options

This section describes options available for the Series 605.

SECTION NINE -- Special Configurations

This section describes special modifications, if any, that are applicable to this instrument.

SECTION TEN -- Manual Changes

This section contains errata information, and notations of any changes made to the instrument since the printing of the manual.

INTRODUCTION

Purpose and Function

The purpose and function of Series 605 instruments is to synthesize a range of microwave frequencies at a variety of power levels and in a variety of modulation modes.

Capabilities

The Series 605 Synthesized Microwave Signal Generator is capable of generating output signals in one of three ranges, depending on instrument configuration (2-8, 6-12, or 10-18 GHz), with output power levels from +10 to -119 dBm; the RF output can be internally or externally modulated in AM, FM and pulse modulation modes.

Performance Characteristics

The Series 605 generates its output signals under manual control, or under remote computer control via the IEEE-488 General Purpose Interface Bus. Complete performance specifications are given in Section 2 of this manual.

Weight and Dimensions

The Series 605 has a weight of 40 lbs (nominal); the dimensions are 5.25 inches (height) by 16.75 inches (width) by 18 inches (depth).

Power Requirements

100/120/220/240 VAC $\pm$ 10%, 50-400 Hz, 100 W max.

Environmental Requirements

The Series 605 is type tested to MIL-T-28800C, Type III, Class 5, Style E, Color R for Navy shipboard, submarine, and shore applications, except as follows:

Non-operating temperature range is -40°C to +70°C.
Relative humidity is limited to 95% noncondensating.
Altitude and EMI requirements are not specified.
Warm-up time is 20 minutes.

Items Furnished

In addition to options and/or accessories specifically ordered, items furnished with the instrument are:

1 ea. - Operation and Maintenance Manual, Part No. 308AM00400
1 ea. - 6 ft. power cord
2 ea. - PC Extender Board
1 ea. - PC Card Extractor
1 set. - Test Data

Items Required

An IEEE-488 interface cable is needed for remote control operation. Appropriate RF output cabling (made to fit the female type N output connector) can be ordered in the form of Accessory A001 (Cable Kit).

Tools and Test Equipment

No special tools are required to operate the Series 605; signal sources used for external modulation should meet the parameters set out in Section 2 of this manual. Test equipment required for calibration or performance verification is described in Section 4.

Storage

Storage of the instrument should be limited to an environment that does not exceed the temperature range of -40°C to +70°C.

Cooling

A cooling fan is installed in the instrument. The cooling air intake and exhaust are both located on the instrument's rear panel. Care must be taken to avoid obstructing the flow of air into and out of the instrument.

Cleaning

The air inlet screen should be cleaned whenever a significant amount of dirt or dust has accumulated. Whenever the instrument covers are removed, the interior should be blown out with low velocity dry air.

Installation and Preparation for Use

The instrument is shipped in an operational condition and no special installation procedures are required. A warm-up time of 20 minutes is recommended.

Receiving Inspection

When the instrument is received, check the carton for evidence of damage. If damage is found, notify the carrier immediately, and open the carton only in the carrier's presence.

Use care in removing the instrument from the carton and check immediately for evidence of shipping damage: loose or broken control knobs, bent or broken connectors, dents or scratches on the panels, etc.

Each Giga-tronics instrument must pass rigorous inspections and tests prior to shipment. Upon receipt, it should immediately be subjected to a performance check to insure that its operation has not been impaired during shipment. The performance verification procedure is described in Section 4 of this manual.

Preparation for Reshipment

To protect the instrument during reshipment, use the best packaging materials available. If possible, re-use the original shipping container. If this is not possible, a strong carton (350 lbs/in^2 bursting strength) or a wooden box should be used.

Wrap the instrument in heavy paper or plastic before placing it in the shipping container. Completely fill the areas on all sides of the instrument with packaging material, taking extra precautions to protect the front and rear panels.

Seal the package with strong tape or metal bands. Mark the outside of the package "FRAGILE -- DELICATE INSTRUMENT".

If corresponding with the factory or local Giga-tronics sales office regarding reshipment, please reference the full model number and serial number. If the instrument is being reshipped for repair, be sure to enclose all available pertinent data regarding the problem that has been found.

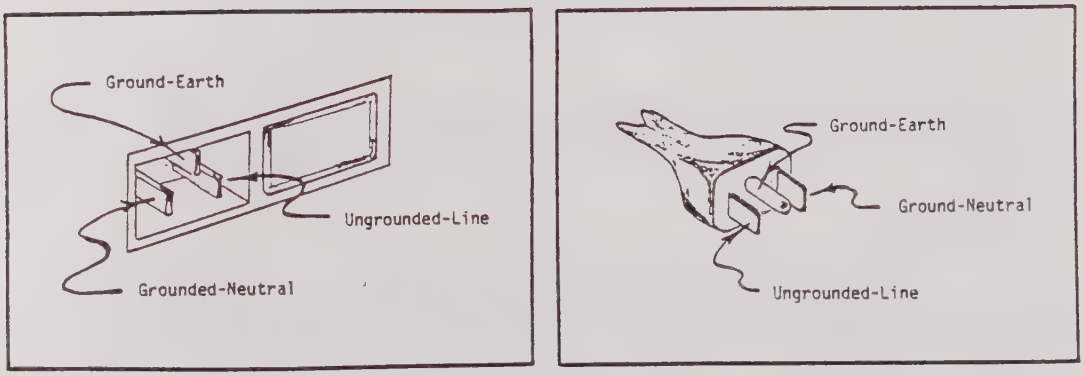


Figure 0.1: Power Line Connection

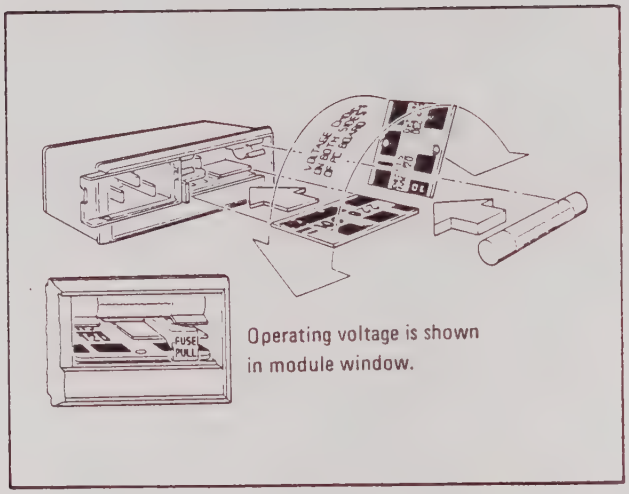


Figure 0.2: Voltage Selector/Fuse Holder

Safety Precautions

C A U T I O N

The instrument can be damaged if operated with the line voltage selector set inappropriately for the applied line voltage. Before operating the instrument, make sure that the instrument power requirements are compatible with the power source to be used. The instrument has been designed for international use over a broad range of voltages: 100, 120, 220, or 240, ± 10%, at 50-400 Hz. The Series 605 uses an internationally approved connector that includes voltage selection, fuse, and filter for RFI protection.

W A R N I N G

The instrument has a 3-wire power cord with a 3-terminal polarized plug for connection to the power source and safety-ground. The ground or safety ground is connected directly to the chassis; therefore, if a 3-to-2 wire adapter is used, be sure to connect the ground lead from the adapter to earth ground. Failure to do this could cause the instrument to float above earth ground, posing a shock hazard.

Voltage Selection

To select the correct operating line voltage, proceed as follows:

Open the cover door and rotate the fuse-pull to the left; remove fuse.

Select the operating voltage by orienting the PC board in order to position the desired voltage label on the top left side. Push the board firmly into the module slot.

Rotate the fuse-pull back into the normal position and reinsert the fuse into the holder, using care to select the correct fuse value.

Fuse Selection

When the instrument is shipped from the factory, it is set for a particular power line voltage (normally 120V for domestic shipping destinations). The power line fuse for this setting is a 2.5A 3AG Slo-Blo. If the instrument is set to operate on a 240V power line, the fuse must be changed to a 1.25A 3AG Slo-Blo.

SECTION ONE

OPERATING INFORMATION

1.0 THE FRONT PANEL

The instrument's major controls and connections are located on the front panel and are illustrated in Figure 1.1; the various functional sections of the front panel are described below.

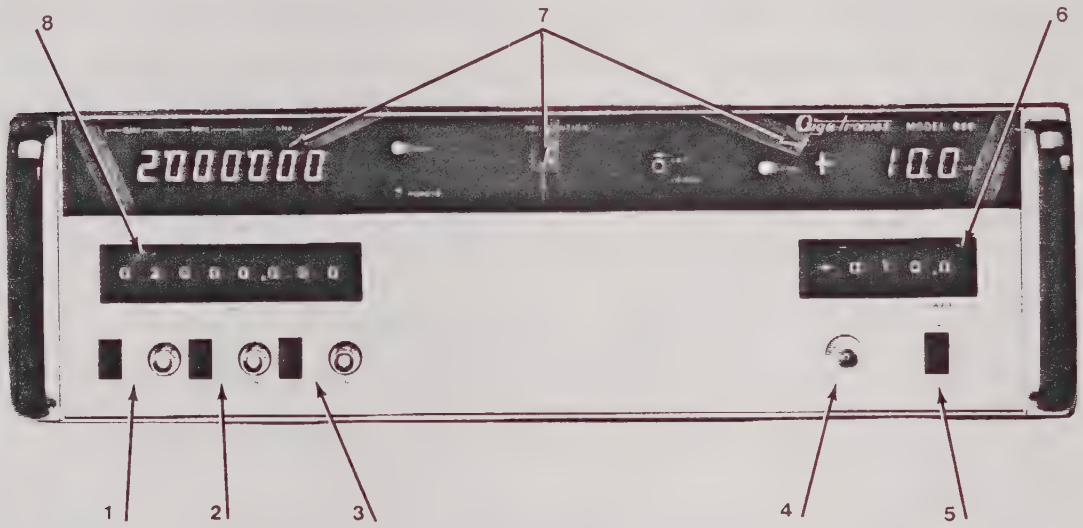


Figure 1.1: Model 605 Front Panel

1. Amplitude Modulation
2. Frequency Modulation
3. Pulse Modulation
4. RF Output
5. Line Power
6. RF Level Setting
7. Displays
8. Frequency Setting

Amplitude Modulation

AM SWITCH (3-position switch) -- This control is used to select the desired AM mode.

'1 kHz' -- Selects internal AM with a fixed 1 kHz sine modulation waveform.

'OFF' -- Turns amplitude modulation off.

'EXT' -- Selects external AM.

AM VERNIER (knob) -- This control is used to adjust AM depth.

EXT IN (BNC connector) -- Accepts an external modulation signal for use in amplitude modulation.

Frequency Modulation

FM SWITCH (3-position switch) -- This control is used to select the desired FM mode.

'1 kHz' -- Selects internal FM with a fixed 1 kHz triangular modulation waveform.

'OFF' -- Turns frequency modulation off.

'EXT' -- Selects external FM.

FM VERNIER (knob) -- This control is used to adjust FM deviation.

EXT IN (BNC connector) -- Accepts an external modulation signal for use in frequency modulation.

Pulse Modulation

PULSE SWITCH (3-position switch) -- This control is used to select the desired pulse modulation mode.

'1 kHz' -- Selects internal pulse modulation with a fixed 1 kHz square modulation waveform.

'OFF' -- Turns pulse modulation off.

'EXT' -- Selects external pulse modulation.

EXT IN (BNC connector) -- Accepts a TTL-level modulation input signal for use in pulse modulation.

RF Output

RF OUT (type N connector) -- Provides the RF output over the entire frequency range of the instrument.

Line Power

POWER (pushbutton) -- Used to switch the instrument's power supply on and off; when the button is in the "off" position the transformer primary is disconnected from the AC source.

RF Level Setting

RF LEVEL (leverwheel switches) -- These switches are used to set the RF output level over a range of -119 to +10 dBm in increments of 0.1 dB. The level selection may be read on the RF level display.

Displays

RF LEVEL READOUT (fluorescent display) -- This 5-digit display is used to indicate the RF output level selected.

LEVEL (LED) -- This indicator lights when the instrument is leveled.

MODULATION READOUT (fluorescent display) -- This 4-digit display is used to indicate modulation depth in percent (AM mode) and to indicate deviation in MHz (FM mode).

AM/FM (switch) -- This lever switch is used to select the modulation display mode (AM depth or FM deviation).

LOCK (LED) -- This indicator lights when the RF output is phase-locked to the internal or external master reference.

REMOTE (LED) -- This indicator lights when the instrument is under remote control, via the IEEE-488 interface.

FREQUENCY READOUT (fluorescent display) -- This 8-digit display is used to indicate the selected RF output frequency.

Frequency Setting

FREQUENCY (leverwheel switches) -- These switches are used to select the frequency of the RF output in increments of 1kHz.

1.1 THE REAR PANEL

The rear panel houses input and output connectors used to interface the instrument with other devices. The different functional sections are illustrated in Figure 1.2 and described below.

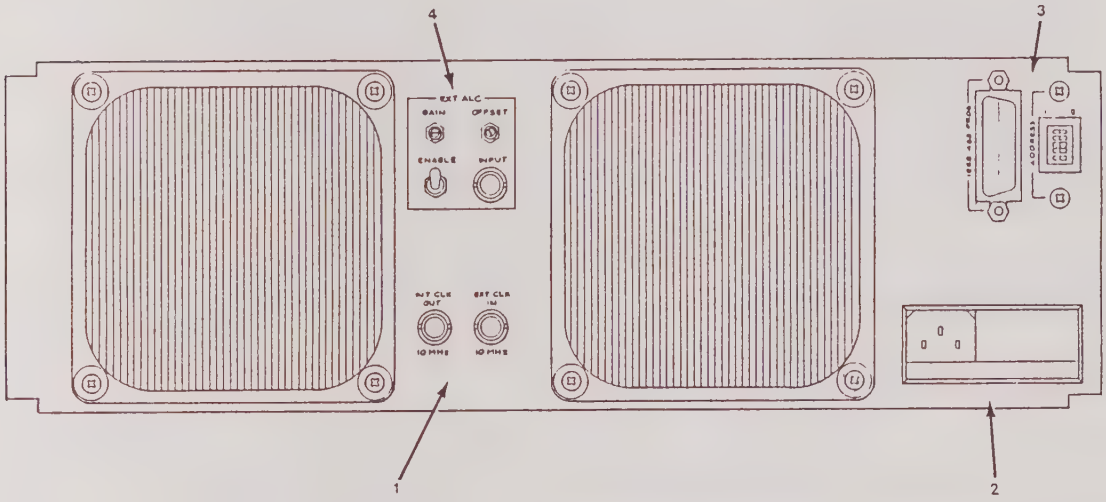


Figure 1.2: Model 605 Rear Panel

1. Master Reference Section
2. Line Power & Fuse Section
3. Interface Section
4. External ALC Section

Master Reference Section

INT CLK OUT, 10 MHz (BNC connector) -- Provides a sample of the 10 MHz internal reference frequency, at 2 Vpp into 50 ohms.

EXT CLK IN, 10 MHz (BNC connector) -- Accepts an external 10 MHz reference input at .5 Vpp, which is automatically substituted for the internal reference frequency.

Line Power and Fuse Section

POWER INPUT (AC plug) -- A 3-terminal polarized connector with the safety ground wired to the chassis.

LINE SELECTION (PC board) -- This card can be oriented four ways to select four different line voltages: 100, 120, 220 and 240 volts.

FUSE HOLDER -- This socket retains the power fuse, which should be a 2.5A 3AG Slo-Blo for 100/120 volt operation, or a 1.25A 3AG Slo-Blo for 220/240 volt operation.

Interface Section

REMOTE (24-pin connector) -- Provides an interface connection between the instrument and other equipment, in accordance with the GPIB IEEE-488-1978 format.

ADDRESS (5-place DIP switch) -- Used to set the GPIB address of the instrument in the form of a 5-bit binary number.

External ALC Section

ENABLE (switch) -- When this switch is in the enable position, the leveling system is programmed to ignore the instrument's internal detector and use instead an external detector input.

INPUT (BNC connector) -- Accepts an input signal from an external detector.

GAIN (potentiometer) -- This screwdriver adjustment is used to calibrate the instrument's leveling system to match the slope of an external detector's transfer curve.

OFFSET (potentiometer) -- This screwdriver adjustment is used to calibrate the instrument's leveling system to match the intercept point of an external detector's transfer curve.

1.2 Front Panel Operation

The following part of section one provides step by step operating procedures for common functional setups.

The basic function of Model 605 is to synthesize microwave signals within a given frequency range. Controls are provided to allow selection of frequency, output level, and modulation mode.

ERROR MESSAGES

The instrument's computer system uses the frequency readout to display error messages when certain controls have been incorrectly set. The following table defines the errors:

Error 1 -- Frequency requested is out of range.

Error 2 -- Level requested is out of range.

Error 3 -- IEEE address switches on rear panel have been set to an invalid address of 31 (all ones).

Error 10 -- Illegal input command (remote operation).

Error 11 -- Illegal input number (remote operation).

Setting Output Frequency and Level (No Modulation)

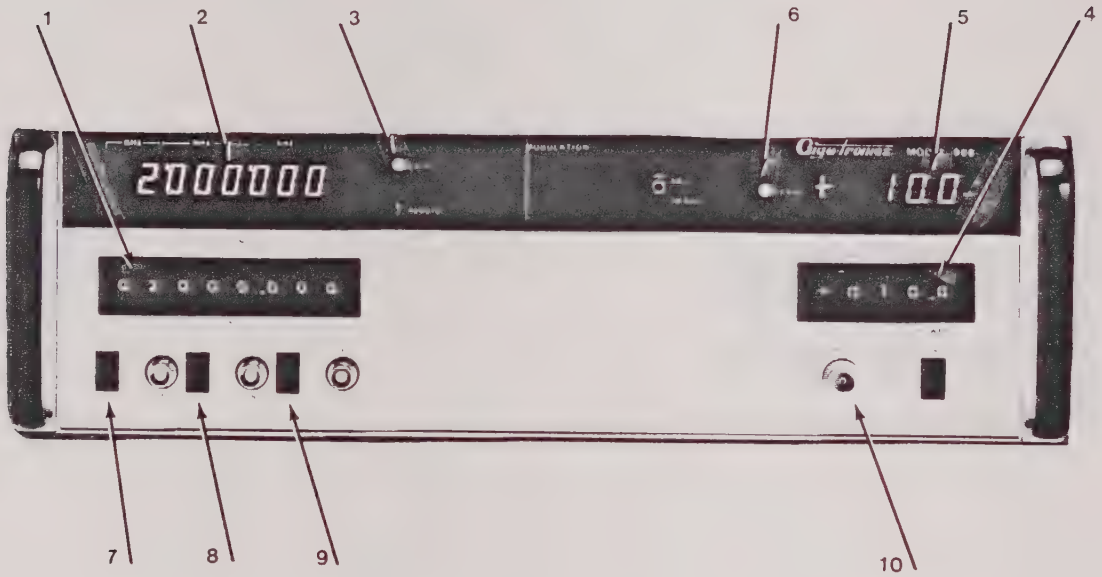


Figure 1.3: Frequency and level settings.

1. Select frequency (leverwheel switches)
2. Read selected frequency on display
3. Verify 'LOCK' indicator is lit
4. Select RF level (leverwheel switches)
5. Read selected level on display
6. Verify 'LEVEL' indicator is lit
7. AM off
8. FM off
9. Pulse Modulation off
10. RF output is available at 'RF OUT' connector

Amplitude-Modulating the RF Output

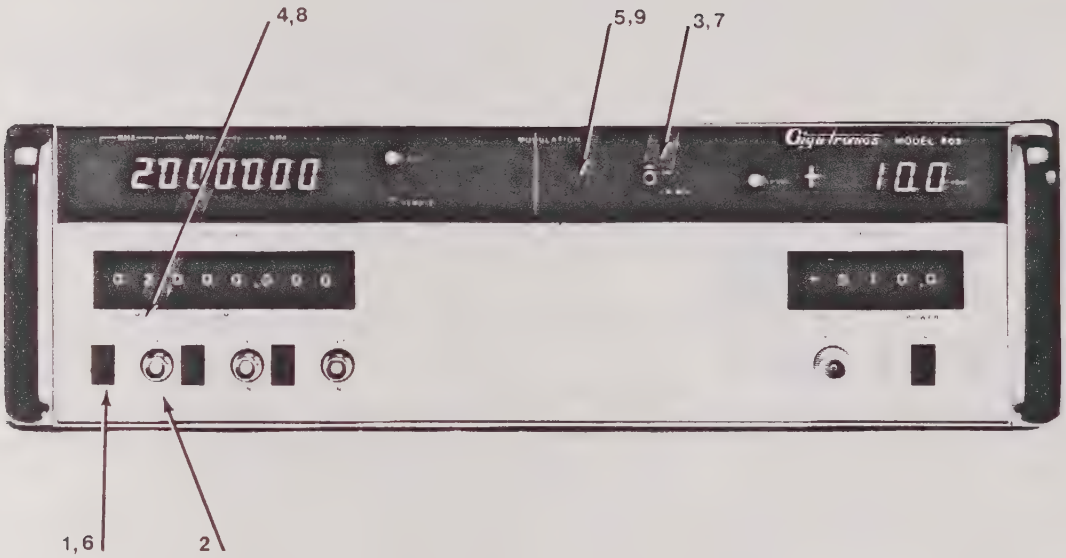


Figure 1.4: Amplitude Modulation

1. Select 'EXT' (external AM mode)
2. Apply external modulation signal at 'EXT IN' connector
3. Select 'AM%' (modulation display mode)
4. Adjust modulation depth
5. Modulation depth is displayed on modulation readout

Or:
6. Select '1 kHz' (internal AM mode)
7. Select 'AM%'
8. Adjust modulation depth
9. Modulation depth is displayed on modulation readout

NOTE: If desired, operation in the AM mode can be simultaneous with operation in the other modulation modes.

Frequency-Modulating the Output

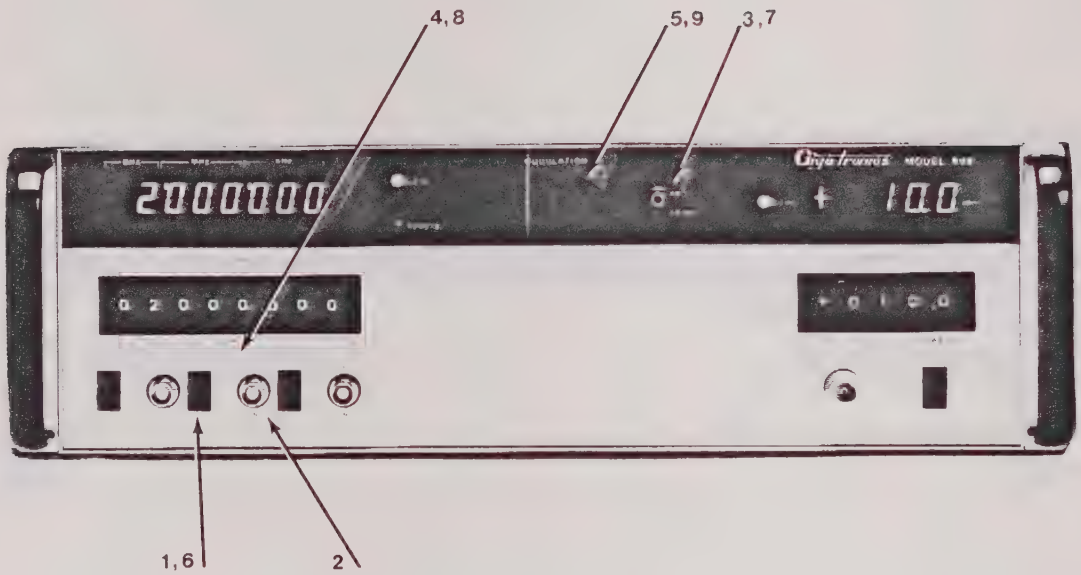


Figure 1.5: Frequency Modulation

1. Select 'EXT' (external FM mode)
2. Apply external modulation signal at 'EXT IN' connector
3. Select 'FM MHz' (modulation display mode)
4. Adjust deviation
5. Deviation is displayed on modulation readout

Or:
6. Select '1 kHz' (internal FM mode)
7. Select 'FM MHz'
8. Adjust deviation
9. Deviation is displayed on modulation readout

NOTE: If desired, operation in the FM mode can be simultaneous with operation in the other modulation modes.

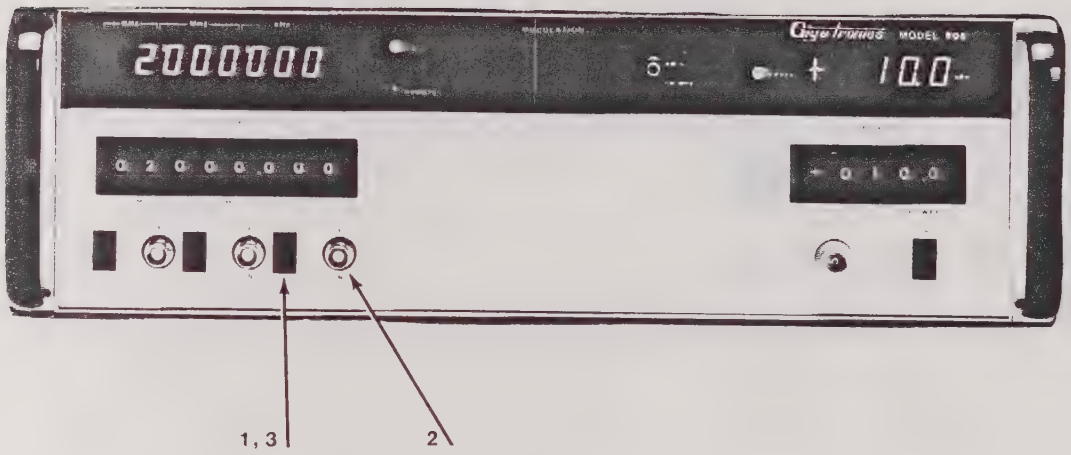


Figure 1.6: Pulse Modulation

1. Select 'EXT' (external pulse mode)

2. Apply external modulation signal at 'EXT IN' connector

Or: 3. Select '1 kHz' (internal pulse mode)

NOTE: If desired, operation in pulse modulation mode can be simultaneous with operation in the other modulation modes.

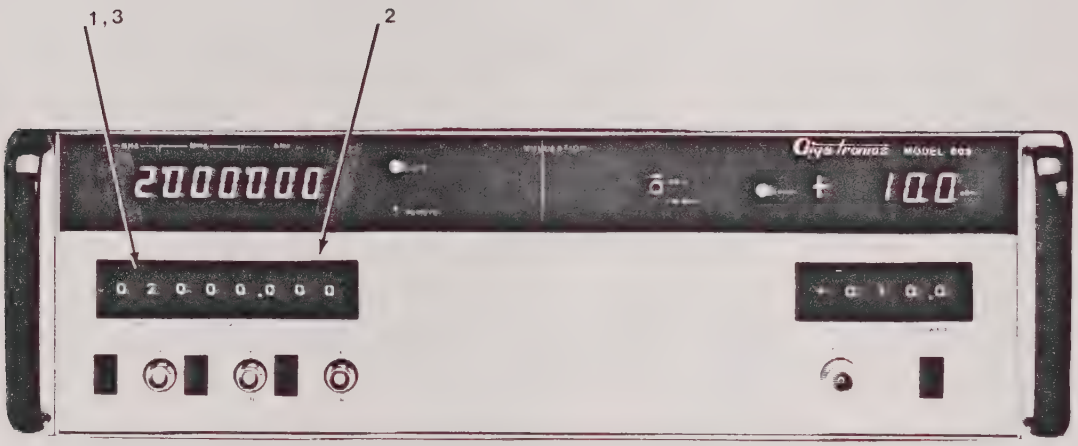


Figure 1.7: Self Test

When the self test function is initiated, the instrument steps through its frequency range from minimum to maximum, in frequency increments specified by the operator, in order to establish that its output is phase-locked and leveled throughout the range. The test repeats until the self test mode is deactivated. If the signal generator fails to lock or level at any point, it stops incrementing and holds at that frequency.

1. Set the 10 GHz frequency setting switch to '9' (activates self test mode).

2. Use the other frequency setting switches to specify the test frequency increment (the switches are in kHz; a setting of 90,010,000 initiates a test in increments of 10 MHz).

3. When the test is completed, deactivate the self test function by changing the 10 GHz frequency setting switch to a number other than '9'.

1.3 Rear Panel Operation

The following part of section one provides step by step operating procedures for functions implemented on the rear panel.

External ALC

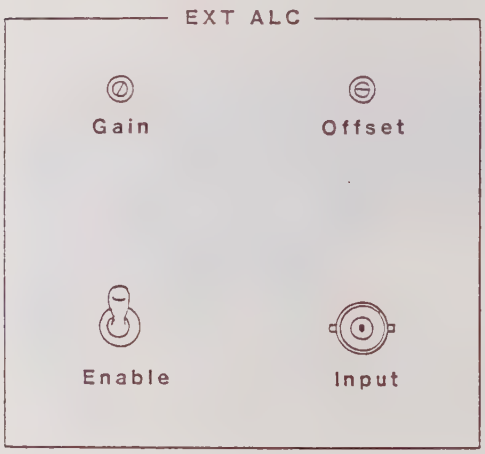


Figure 1.8: External ALC

The external ALC function provides remote leveling capability. The circuit is designed to operate with a directional coupler/diode detector having a standard negative output. Gain and offset adjustments permit calibration of the instrument to match individual detectors. Note that losses in the cable between the instrument RF output and the remote detector will place a limit on both maximum output and leveling range.

1. Connect the remote cable and detector to the instrument output. Connect the coupler/detector output to the rear panel 'EXT ALC' input.

2. Connect a power meter to the detector output and set the 'EXT ALC' switch to the 'ENABLE' position.

3. With the instrument's RF level set to +4 dBm, adjust the rear panel 'GAIN' for a power meter reading of +4 dBm.

4. Set the RF level to -4 dBm and adjust 'OFFSET' for a power meter reading of -4 dBm.

5. Repeat steps 3 and 4 as needed.

External Master Reference

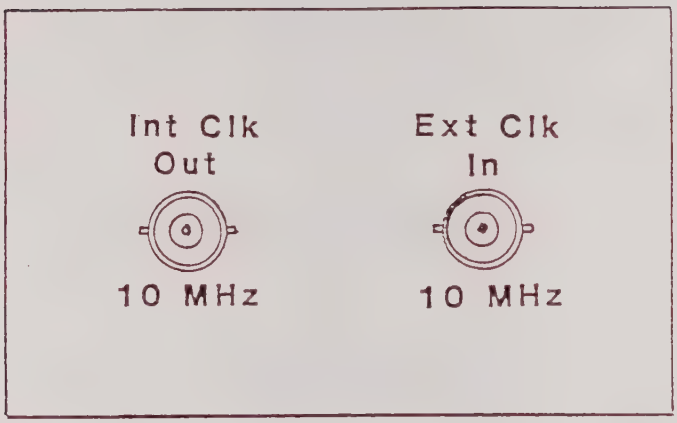


Figure 1.9: External Master Reference

The clock output provides a buffered 10 MHz signal derived from either the internal master reference or any external signal applied. This output will drive a 50 ohm load to 2 Vpp.

The clock input accepts an external 10 MHz standard with an amplitude between .5 and 5 Vpp. The accuracy of the standard must be within 1 part per million to insure that the instrument will lock to it. The instrument will automatically switch to the external reference when a signal is present.

1.4 External Programming (IEEE-488)

Model 605 permits data bus control in accordance with the IEEE Standard Digital Interface for Programmable Instruments IEEE-STD 488-1978.

The following subsets of the standard are implemented:

SH1	Source Handshake	Complete Capability
AH1	Acceptor Handshake	Complete Capability
T8	Talker	Basic Talker, No Serial Poll No Talk Only, Unaddress if MLA
TE0	Extender Talker	No Capability
L4	Listener	Basic Listener, No Listen Only, Unaddressed if MTA
LE0	Extended Listener	No Capability
SR0	Service Request	No Capability
RL2	Remote/Local	No Local Lockout
PP0	Parallel Poll	No Capability
DC0	Device Clear	No Capability
DT0	Device Trigger	No Capability
C0	Controller	No Capability

1.4.1 IEEE-488 Hardware Configuration

INTERFACE CONNECTOR

The following table indicates the pin assignments for the rear panel 24 pin IEEE-488 interface connector.

Contact	Signal Line
1	D101
2	D102
3	D103
4	D104
5	EOI
6	DAV
7	NRFD
8	NDAC
9	IFC
10	SRQ
11	ATN
12	Shield
13	D105
14	D106
15	D107
16	D108
17	REN
18	GND (6)
19	GND (7)
20	GND (8)
21	GND (9)
22	GND (10)
23	GND (11)
24	GND Logic

The contact assignments are those required by the IEEE-488 standard. Thus, most users need only connect a standard interface cable between their controller and the 605 interface connector.

ADDRESS ASSIGNMENT

The remote control address is assigned by the five small switches next to the interface connector. Switch 1 is the LSB; and switch 5 is the MSB. Thus, to assign the 605 an address of 6 (listen address '&' and talk address 'F'), the switches would be set as follows:

Switch number	MSB 5	4	3	2	1 LSB
Switch setting	0	0	1	1	0

SYNTAX CONFIGURATION

The standard remote control syntax (as described in this manual) is enabled by setting S7 on the CPU PC board (A4) to the on (up) position. S7's off position is reserved for enabling a special

syntax which might be required in unusual applications. The instrument is normally shipped from the factory with S7 set to the on position.

1.4.2 General Command Structure

CHARACTER REPRESENTATION

In this manual, the ASCII characters sent in a message will be represented in single quotes.

e.g.: 'MESSAGE' corresponds to a string of seven bytes whose hexadecimal values are $4D, $45, $53, $53, $41, $47, $45.

Special characters will be represented as follows:

'<CR>'	Carriage return, $0D
'<LF>'	Line Feed, $0A
'b'	One or more spaces $20
'z'	Zero or more spaces
's'	One space
'd'	Decimal digit

COMMAND INTERPRETATION

The 605 uses a 40 character buffer to accept and store characters sent to it via the interface. Multiple sequential spaces are compressed to a single space character for storage in the buffer. The buffer's contents are interpreted and the buffer is reset upon receipt of a character sent with the EOI line asserted or upon receipt of any of the following delimiter characters:

'<CR>' '<LF>' ',' ':' ';' '/' '\'

Multiple commands may be sent in a single message if they are separated from each other by a space or one of the above delimiter characters. If the commands are separated by spaces, they will not be interpreted until the entire message has been sent. (Note that if spaces are used to separate commands, care must be taken to assure that the 40 character buffer does not overflow: buffer overflow may cause some commands to be ignored.) If the commands are separated by delimiters, each command will be interpreted individually upon receipt. Unless the delimiter used is a carriage return, a potential problem exists when entering multiple commands separated by delimiters: if one of the commands is entered erroneously, it will be ignored and the correct commands accepted after only a momentary error display. The error message may not be displayed long enough to be read.

COMMAND FORMAT

Each command consists of a verb, followed by zero or more spaces, followed by an argument.

e.g.: 'AMzINT' AM is the verb and INT is the argument

'FAz12.3E+3' FA is the verb and 12.3E+3 is the argument

NUMERIC ARGUMENTS

Frequency and level setting commands use numeric arguments (represented in command descriptions as 'n'). The format for numeric arguments (described below) is sufficiently flexible that no special formating will be necessary when using most IEEE-488 controllers. Signed or unsigned numbers are acceptable. Integers or decimal fractions are permitted and may be followed by a signed or unsigned one or two digit exponent. Leading zeroes are permitted, but spaces within a number are not permitted. The integer and optional fractional part are each restricted to a maximum length of 10 digits.

The following are examples of valid numeric arguments:

'b25.7' / '-32.1' / '0.3' / '2958.763E-2'

'6E-10' / '-000.000000001E+10' / 'b7b' / '1E6'

1.4.3 Non-numeric Commands

Each subsection describes a verb and its valid arguments. Most commands perform functions in a way that is similar to the 605's front panel controls, except where noted.

'AM' (set amplitude modulation mode)

'AMzOFF': amplitude modulation off
'AMzEXT': external AM
'AMzINT': internal AM, fixed 1 kHz sine wave (unless 'PANELzAM' is sent, depth defaults to PRESET value)

'FM' (set frequency modulation mode)

'FMzOFF': frequency modulation off
'FMzEXT': external FM

'FMzINT': internal FM, fixed 1 kHz triangle wave (unless 'PANELzFM' is sent, deviation defaults to PRESET value)

'PULSE' (set pulse modulation mode)

'PULSEzOFF':	pulse modulation off
'PULSEzEXT':	external pulse modulation
'PULSEzINT':	internal pulse modulation, 1 kHz square wave

'PANEL' (enable front panel modulation vernier)

'PANELzAM':	front panel AM vernier (depth) activated
'PANELzFM':	front panel FM vernier (deviation) activated

'PRESET' (enable preset potentiometer -- replaces front panel vernier)

'PRESETzAM':	preset AM depth pot activated
'PRESETzFM':	preset FM deviation pot activated

'EXTALC' (enable/disable external ALC)

'EXTALCzON':	Enables
'EXTALCzOFF':	Disables

'DISPLAY' (enable/disable front panel fluorescent displays)

'DISPLAYzON':	Enables	(NOTE: in the disabled mode, brackets at
'DISPLAYzOFF':	Disables	the left and right digits of the displays serve as a standby indication)

1.4.4 Set Frequency Command

This command requires a numeric argument, specifying the frequency in MHz. For units with Option 03 (1 kHz resolution), up to three digits may be given to the right of the decimal, permitting the frequency to be specified to the nearest 1 kHz (e.g., 'n' = 4499.325 specifies 4.499325 GHz). Digits exceeding the frequency resolution of the instrument are ignored.

'FAzn' (set frequency to 'n')

1.4.5 Set Level Command

The set level command requires a numeric argument, specifiying a level in dBm with .1 dB resolution. Digits specifying a finer resolution are rounded to the nearest .1 dB.

The 'LEVEL' command causes appropriate values for the step attenuator and leveling loop programming to be computed from the argument. The computation causes the step attenuator to switch at argument values which are evenly divisible by 10 (e.g., between '-29.9' and '-30.0).

'LEVELzn' (set output level to 'n')

The argument specifies the output level in dBm. Valid argument ranges are:

$-120.0 \leq$ 'n' $\leq +15.0$

LEVELING LOOP RANGE LIMITATIONS

The leveling loop range is limited by the maximum output power which the instrument can produce. At very low levels, the on/off ratio of the instrument's PIN attenuators may also limit the loop's range. When the loop's dynamic range is exceeded, the front panel level light will go out.

'ERRORs2' will be issued upon receipt of invalid level command arguments. Leveling loop accuracy is reduced at very low levels (below about -12 dB).

1.4.6 Self Test Command

This command initiates a step and lock test over the full frequency range of the instrument. The frequency increment of the test is specified by 'n', in kHz.

'TESTzn' (perform self test in increments of 'n')

1.4.7 Reply Messages

A reply message will be sent over the interface by the 605 whenever it is addressed to talk. If unaddressed in the middle of a message, any remaining characters are cleared from the output buffer. EOI is asserted during the last character ('<LF>') of each message. The type of message sent is determined by the 'SEND' commands described in the following subsections. If an error condition exists, a 'SENDzERROR' type message will be sent instead of the message type requested except for 'SENDzNUL' which always returns a null line (<CR><LF>').

'SENDzNUL' Null line.

Message will be a null line ('<CR><LF>') even if an error condition is present.

'SENDzFREQ' Frequency message.

The value sent always represents frequency in MHz.

'SENDzPOWER' Power message.

The value sent represents power in dB or dBm, as appropeiate, and is always signed as an integer in the following form: P INT $\pm$ xxx.x. If no valid power reading is available, the message is sent with 'n' = '-----'.

'SENDzSTATUS' Status message.

The message sent is:
'sLOCKsdsLEVELsdsCALsd<CR><LF>'
where each 'd' is either '1' or '0' to represent true or false. 'LOCK' and 'LEVEL' are true when their corresponding front panel lights are on.
'CAL' is always 0.

'SENDzERROR' Error message.

The message sent is <CR><LF> if no error exists. When an error condition does exist, the message sent is 'sERRORsdd', where 'dd' is the error code displayed on the front panel.

STATUS MESSAGE

The message normally sent is:
'sLOCKsdsLEVELsds<CR><LF>'
where each 'd' is either '1' or '0' to represent true or false. 'LOCK' and 'LEVEL' are true when their corresponding front panel lights are on.

ERROR MESSAGE

When an error condition exists, the message sent is 'sERRORsdd' where 'dd' is the error code displayed on the front panel. Individual error messages are as follows:

ERROR 1 -- requested frequency out of range
ERROR 2 -- requested level out of range
ERROR 3 -- generator set to illegal bus adress (all switches on)
ERROR 10 -- illegal input word (remote)
ERROR 11 -- illegal input number (remote)

1.4.8 Interface Initialization Values

The IEEE-488 interface is initialized upon assertion of IFC by the controller, upon instrument power up (CPU reset), and whenever the rear panel address switch settings are changed. The 605's remote control data are initialized to a "no modulation" condition. Frequency and output level are initialized to the minimum values.

SECTION TWO

PERFORMANCE SPECIFICATIONS

Frequency Characteristics

FREQUENCY RANGE: indicated (in GHz) by model number suffix
(e.g., Model 605/2-8: 2 to 8 GHz)

FREQUENCY RESOLUTION: 1 MHz (standard)
1 kHz (instruments with option 03)

FREQUENCY ACCURACY/STABILITY: Same as time base

INTERNAL TIME BASE FREQUENCY/ACCURACY: 10 MHz, ± 1 X 10E-6

INTERNAL TIME BASE STABILITY: <1 X 10E-6/year (standard)
<1 X 10E-9/day (with option 06)

EXTERNAL TIME BASE: 10 MHz, ± 1 X 10E-6 or better, 0.5 Vpp (overrides internal time base)

TIME BASE OUTPUT: Buffered 10 MHz, 2 Vpp into 50 ohms (derived from internal or external time base)

Spectral Purity

HARMONICS, SUBHARMONICS: varies with frequency range; see table below

RANGE (GHz)	SPECIFICATION
2-8, 6-12, 6-18	<-40 dBc
.01-8	<-40 dBc
2-12	<-40 dBc but may degrade to -10 (typ) above 5.3 GHz
1.8-7.5	<-40 dBc
10-18	<-50 dBc

SPURIOUS (NON-HARMONICS): <-55 dBc

POWER LINE/FAN RELATED: <-45 dBc

SSB PHASE NOISE: <-75 dBc/Hz (typical) at 10 kHz offset, 1 Hz BW

Output Characteristics

OUTPUT LEVEL RANGE: varies with frequency range; see table below

RANGE (GHz)	SPECIFICATION
2-8, 6-12, 10-18	-119 dBm to +10 dBm
.01-8	-119 dBm to +10 dBm
6-18	-119 dBm to +5 dBm
2-12	-119 dBm to +6 dBm
1.8-7.5	-119 dBm to +10 dBm

OUTPUT LEVEL RESOLUTION: 0.1 dB

OUTPUT LEVEL ACCURACY: ± 2 dB

LEVEL FLATNESS: ± 1 dB

OUTPUT IMPEDANCE: 50 ohms, nominal

OUTPUT CONNECTOR: type-N female

OUTPUT VSWR: <2:1

EXTERNAL ALC: Negative crystal detector; gain and offset adjustments provided

Pulse Modulation Characteristics

PULSE RATE: 10 Hz to 1 MHz (external); 1 kHz fixed (internal)

RISE/FALL TIMES: <25 nsec

SETTLING TIME: ± 1 dB within 100 nanoseconds

ON/OFF RATIO: >80 dB

EXTERNAL MODULATION INPUT: TTL compatible, 10 Hz to 1 MHz, >0.1 usec width, positive level for RF "on"

Amplitude Modulation Characteristics

MODULATION RATE: 10 Hz to 100 kHz (3 dB points referenced to 1 kHz), any waveform (external), 1 kHz fixed sine (internal)

DEPTH: 0 to 82% (0 to 20 dBm), min

INPUT SENSITIVITY: 1 Vpp = 50% modulation at 1 kHz rate

INPUT IMPEDANCE: 600 ohms, AC coupled, BNC

DISTORTION: <5% at 1 kHz rate, 50% depth (sine wave)

DISPLAY ACCURACY: ± 10% at 1 kHz rate, 50% depth

Frequency Modulation Characteristics

MODULATION RATE: 10 Hz to 1 MHz (external)
1 kHz fixed triangle (internal)

DEVIATION: ± 5 MHz, peak

INPUT SENSITIVITY: 2 Vpp for maximum deviation

INPUT IMPEDANCE: 50 ohms (nominal), BNC

DISTORTION: <5% at 500 kHz rate, 5 MHz peak deviation

DISPLAY ACCURACY: ± 10% at 100 kHz rate, 3 MHz peak deviation

General

REMOTE INTERFACE: IEEE STD 488-1978

WARM-UP TIME: 20 minutes, max

OPERATING TEMPERATURE RANGE: 0 to +50°C

ENVIRONMENTAL REQUIREMENTS: Type tested to MIL-T-28800C, type III, Class 5, Style E, Color R

POWER: 100/120/220/240 VAC ± 10%, 50-400 Hz, 200 watts max

DIMENSIONS: 16.75" X 5.25" X 18"; 40 lbs nominal

CALIBRATION INTERVAL: 9 months

SECTION THREE

THEORY OF OPERATION

GENERAL CONFIGURATION OF THE INSTRUMENT

The Model 605 is a single-band microwave generator which employs a YIG oscillator, tuned by a phase lock loop system, to synthesize its RF output. All output frequencies are phase locked to a 10 MHz master reference, and may be selected in increments of 1 kHz. Output power is controlled by a leveling system, and may be selected in increments of 0.1 dB; a 10 dB step attenuator on the output is used to adjust the power in larger increments. The RF output may be internally or externally modulated in AM, FM and pulse modulation modes. Remote operation is made possible by an IEEE-488 interface bus. All functions of the instrument are controlled by an internal computer.

Circuit boards A1 through A4 are plugged into the CPU bus board (A102) and constitute the internal computer. A5, also plugged into the CPU bus, is the level control board.

Circuit boards A6 through A13 are plugged into the RF bus board (A103); these are the high-frequency circuits used to synthesize the instrument's output signal, including the phase lock loops and the YIG driver. The RF bus board itself also houses the FM driver circuit.

The microwave deck includes the YIG oscillator, the RF module, the enclosed 300-350 MHz oscillator board (A104), the enclosed 110 MHz oscillator/multiplier board (A113), and the 10 dB step attenuator.

The modulation control board (A118) is located behind the front panel.

The power supply is located behind and adjacent to the CPU bus.

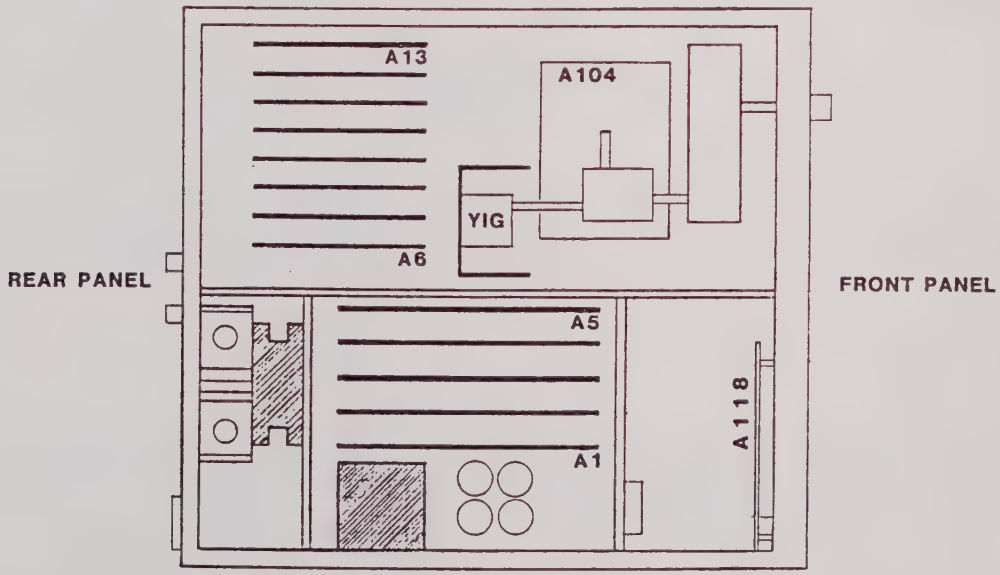


Figure 3.1: Model 605 Interior Layout

THE COMPUTER

An internal computer is used to control the Model 605. The computer is based on a Motorola 6809 microprocessor with its internal clock controlled by a 3.579 MHz crystal. This clock frequency was selected to minimize beat notes generated by its harmonics and the various frequencies generated within the instrument.

The microprocessor controls, and communicates with, other circuits by means of Peripheral Interface Adapters or PIAs. These devices act as windows through which information and instructions are transmitted to and from the 6809's 8-bit data bus. The data bus is used to send control signals (including multiple-bit numbers in parallel) to the various functional sections of the instrument, and also to take in data from those locations. Digital/analog and analog/digital conversion are used by the computer in order to generate and measure analog signals.

The microprocessor's 16-bit address bus can access up to 64K of memory. Much of this memory capability is not presently used by the Model 605, so there remains room for expansion. Because control software can be rewritten more readily than control hardware can be rebuilt, Giga-tronics's memory-intensive approach has made this an extremely adaptable instrument.

Giga-tronics produces its own computer software, which is stored in PROM devices on the memory board (A2); also in that location are RAM devices used for temporary data storage. A "reset" PROM located on the CPU board itself (A4) contains initialization data, level characterization data, and other information unique to the individual instrument.

The microprocessor, the PIAs, and the semiconductor memory devices will be referred to collectively as the computer. The computer generates and receives digital data required for operation of almost every instrument function. It receives and interprets the operator's commands, through either the front panel switches or the remote interface; it returns information to the operator, through either the front panel displays or the remote interface; it selects appropriate reference frequencies, intermediate frequencies and divisors to generate the RF output; it tunes the YIG oscillator; it activates the appropriate harmonic filter line for the RF path; it controls the power level and the modulation of the RF output; it monitors the functioning of the instrument and supplies error messages and fault indicators to the operator.

THE RF PATH

Coupling, leveling, modulation, filtering, and attenuation of the output signal are accomplished in the path between the YIG oscillator and the instrument's RF output connector. Some power loss inevitably takes place in this RF path; Giga-tronics has cut this loss to a minimum, by using printed microstrip conductors and miniature components to create a hybrid circuit which incorporates most of the above functions into a single module. This clustering of RF circuits greatly reduces the power loss inherent in designs requiring multiple transitions and connectors.

Samples of the RF output signal are required by two circuits outside the RF path. Microstrip couplers located within the module are used to return

portions of the RF signal to the output phase lock loop (by way of the sampling mixer) and to the level detector.

A leveler circuit within the module, consisting of PIN diodes, functions as a variable attenuator. A signal from the level control circuit regulates current through these diodes in order to adjust output power.

The output of a YIG oscillator is not spectrally pure. Harmonics of the fundamental frequency are usually present at amplitudes of -12 to -20 dBc. Low-pass filters (consisting of shaped microstrip elements) are used to eliminate these harmonics, and the path through the RF module is subdivided into either two or three filter lines, depending on output bandwidth. The switching of these paths is performed by PIN diode circuits, rather than by mechanical switches, for increased reliability.

The filter switch circuits are also used to pulse-modulate the RF output (the pulse modulation input is applied to the switch that controls the appropriate filter line). A second pulse modulation input is used to switch a 50 ohm termination into the RF path ahead of the filter switches during pulse "off" intervals. This is necessary because, during the "off" period, the RF path is opened and loses its output termination. If an additional termination were not switched into the circuit, reflected power would be picked up by the level coupler and would interfere with level control.

The output of the RF module is applied to the 10 dB step attenuator, which is connected directly to the front panel. Interconnections between components in the RF path are made through semi-rigid coaxial cable (waveguide is not required for the frequencies generated by the 605).

AMPLITUDE CONTROL

The output amplitude of the instrument is controlled by a combination of fixed-step attenuation and closed-loop leveling.

The output stage of the synthesizer consists of a step attenuator which provides up to 110 dB of attenuation in 10 dB increments. Finer control of the output level is provided by the closed loop leveling system, also referred to as Automatic Leveling Control or ALC.

The level control circuit is basically a loop amplifier with multiple inputs, of which one is feedback from the instrument's level detector, a device which returns a negative voltage proportional to the square of detected power. The RF measured by the detector is coupled from the output path by a circuit in the RF module (during operation in the external ALC mode, a remote detector is substituted for the internal one). The detector signal is amplified and applied to the summing junction of the leveling loop amplifier; it may be considered the "variable" input, in that it changes in response to the loop amplifier's output.

The "reference" input to the loop amplifier is a composite of three signals: a correction voltage from the temperature compensation circuit (A112), a fixed leveling input which the computer programs by means of a digital to analog converter, and the AM signal, if any, from the modulation control board (A118). The AM signal is processed by a logarithmic amplifier to give

it the same logarithmic characteristic as the other two inputs, so that all three can be combined by a summing amplifier. The combined signal is then processed by an antilogarithmic amplifier on its way to the loop amplifier, where it is compared to the amplified input from the detector.

The loop amplifier output is applied to an amplifier which drives the PIN diode leveler in the RF module; the leveler is driven so as to balance the "reference" input (the combined level reference inputs) against an equal and opposite "variable" input (the feedback input from the detector.)

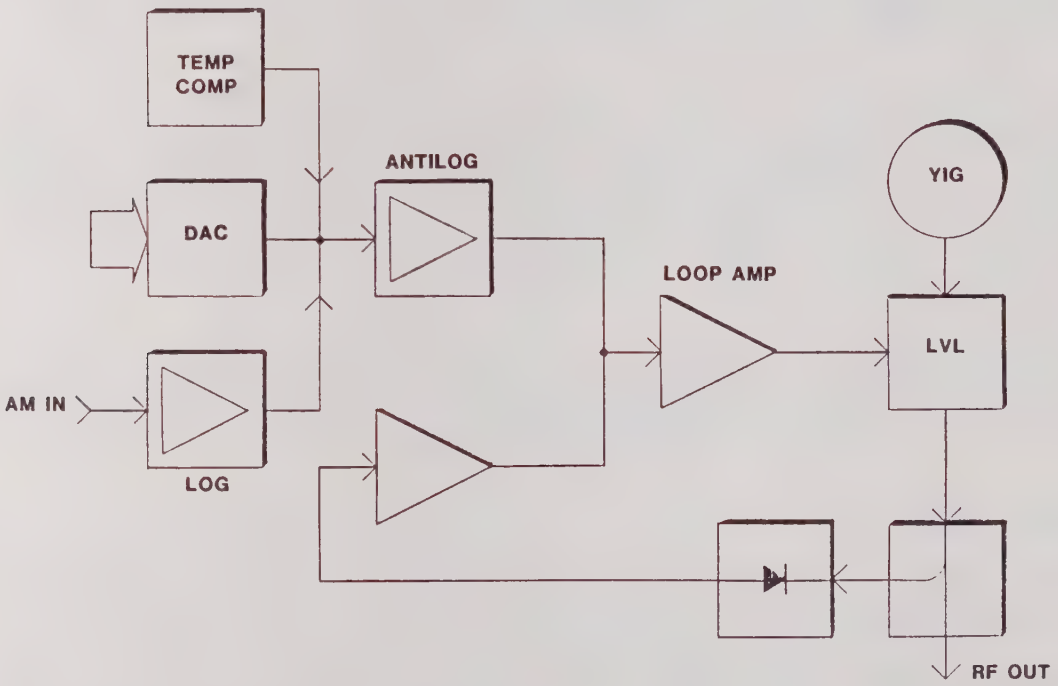


Figure 3.2: Amplitude Control

In other words, the leveler adjusts RF power until the detector feedback input just cancels the other input to the loop amplifier.

In setting the leveling reference (through the programming of a digital to analog converter), the computer includes compensation factors from a level-characterization table stored in the instrument's "reset" PROM (see A4). This data is individual to the instrument and is compiled during production testing.

AMPLITUDE MODULATION

As described above, one component of the reference input to the loop amplifier in the level control circuit (A5) is an amplitude modulation input. This input comes from the modulation control board (A118), where it is derived from the internal or external modulation signal. This board also houses the logic circuits by which the modulation mode is selected under

The AM input to the level control circuit (processed by a log amplifier to match it to the logarithmic characteristic of the computer's leveling reference and the temperature compensation input) supplies the leveling loop amplifier with a variable, rather than a fixed, leveling reference. The level control circuit furnishes a modulated control voltage to the leveler in the RF module in order to match the modulation of the reference. The result is an amplitude modulated RF output, with a modulation depth of up to 82%.

PULSE MODULATION

Pulse modulation is performed by means of path-switching circuits in the RF module. Depending on output bandwidth, there will be either two or three filter paths through the module, of which only one is active at a time. PIN diode circuits are used to switch these lines on and off; pulse modulation is accomplished by shutting off the active path intermittently (a positive voltage at the filter line's control pin on the outside of the module shuts the path off). By this method, an on/off ratio of greater than 80 dB can be achieved.

The drive signals used in pulse modulation originate on the modulation control board (A118), and are derived from the internal or external modulation signals. The internal signal generator is located on this board, as are the logic circuits by which the modulation mode is selected under either local or remote control.

FREQUENCY MODULATION

Frequency modulation of the RF output is achieved by modifying the fine tuning of the YIG oscillator. The current supply to the YIG's fine tuning coil is controlled by the FM driver (see A103), which in turn is controlled by the output phase lock loop circuit (A6). Normally, the PLL's driver output is derived from the outputs of the phase comparator, suitably filtered and amplified. During operation in the FM mode, however, this phase comparator signal is summed with a modulation signal, providing a modulated drive and resulting in a frequency modulated output from the YIG oscillator.

The FM signal furnished to the output PLL originates on the modulation control board (A118), and is derived from the internal or external FM signal. This board also houses the logic circuits by which the modulation mode is selected under local or remote control, as well as the function generator used to produce internal modulation signals.

FREQUENCY SYNTHESIS

The output frequency of Model 605 is produced by a YIG oscillator. Coarse tuning of the YIG is performed by the YIG driver circuit (A13), a programmable current source which the computer controls by means of a digital to analog converter and amplifier. This current source (connected to the YIG's "tuning" coil) can bring the YIG frequency within 50 MHz of the desired value. Fine tuning of the YIG is accomplished by the output phase lock loop, which supplies a controlled tuning current to the YIG's FM coil. The synthesis process used by Model 605 involves a total of six phase lock loops;

the following is an introduction to phase lock loop circuits.

PHASE LOCK LOOPS

The purpose of a phase lock loop (PLL) is to control a variable frequency oscillator so that its output frequency has the same accuracy and stability as that of a fixed reference oscillator. It works by comparing two frequency inputs, one fixed and one variable, and supplying a correction signal to the variable oscillator in order to achieve and maintain a constant phase relationship between the two inputs. The following discussion refers specifically to the phase lock loop circuits used in Giga-tronics signal generators, and is not meant to encompass all types of phase lock loops.

The stability and accuracy of a reference frequency (for example, the signal produced by a 10 MHz crystal oscillator) can be transferred to a voltage controlled oscillator (VCO) by means of a phase lock loop. The 10 MHz signal is applied to the reference input of the PLL, and the VCO output frequency is fed back to the variable input of the PLL. A phase detector in the PLL circuit compares the two inputs and determines whether the variable input is leading or lagging the reference. The phase detector has two outputs; pulses

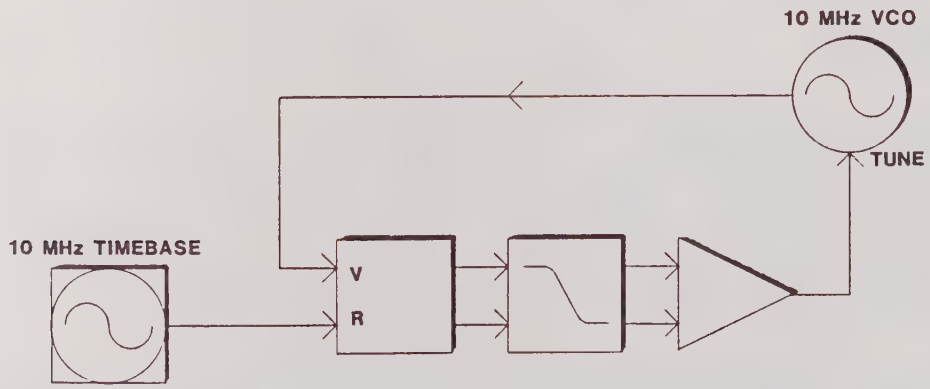


Figure 3.3: Elementary phase lock loop

appear at one of them (which one depends on whether the variable input is leading or lagging), and the width of the pulses is proportional to the degree of phase difference. The pulses are averaged by a low pass filter and DC amplifier into a correction signal, which causes the VCO frequency to increase or decrease in order to reduce the phase difference between the two input frequencies. When the phase error is eliminated, the frequencies are equal, the loop is said to be "locked", and the VCO frequency acquires the accuracy and stability of the reference input.

Although the variable input to the phase detector should equal the frequency of the reference input, it need not equal the frequency of the VCO. If a frequency divider is introduced between the VCO and the variable input, the VCO can be run at a frequency that is a multiple of the reference frequency. For example, if the VCO output is divided by ten before being applied to the phase detector input, the VCO can run at 100 MHz and still be phase locked to a 10 MHz reference. A frequency divider which intervenes between the VCO and the phase detector's variable input is called a prescaler. If the prescaler is programmable (that is, if it can be set to a given divisor), a variety of frequencies can be phase locked to a single reference frequency.

Since the output frequency must be some multiple of the reference frequency input to the phase detector, the reference frequency limits the resolution of the system: with a 10 MHz timebase, frequencies of 70 MHz or 80 MHz could be generated, but not 73 MHz. This is because digital frequency dividers can perform integer divisions only; the prescaler cannot be programmed to "divide by 7.3". However, if the reference frequency applied to the phase detector is itself programmable, this difficulty can be overcome, either by using a 1 MHz reference frequency and dividing the output by 73, or by using a 7.3 MHz reference and dividing the output by 10.

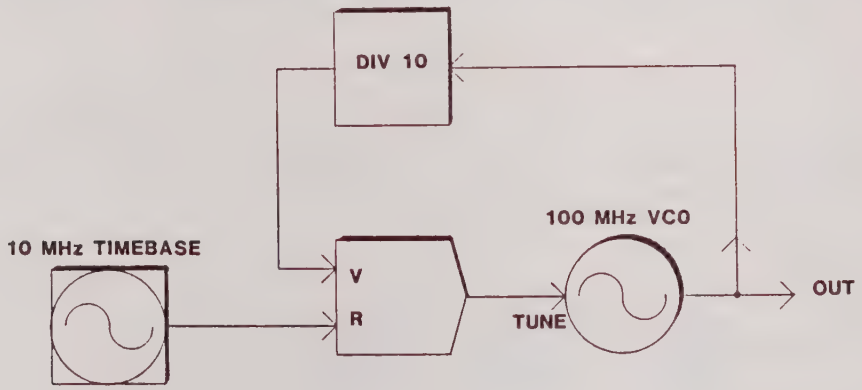


Figure 3.4: 100 MHz phase lock loop

MICROWAVE FREQUENCY SYNTHESIS

Digital synthesis of microwave frequencies is impeded by two inherent difficulties. First, these frequencies are well above the operating range of digital logic circuits. Second, the bandwidths required tend to be large; even a single-band unit such as the Model 605 must cover an output range of several thousand MegaHertz. A requirement for fine frequency solution over so wide a range complicates the synthesis process.

In the Model 605, RF mixers are used to downconvert microwave signals to more workable frequencies. Generally, a mixer provides an intermediate frequency equal to the difference between two high-frequency inputs. For example, a step-recovery diode multiplier and an RF mixer (used in a combination known as a sampling mixer) are used to derive a low frequency I.F. equal to the difference between the output microwave signal and some harmonic of a stable 100 MHz input. The various reference signals used to synthesize the output are generated at, or mixed down to, frequencies low enough to drive digital circuits (usually below 200 MHz).

The problem of bandwidth, insofar as it limits frequency resolution, is overcome through the use of compounded PLL circuits to produce reference frequencies programmable in small increments over a wide range. All told, six different phase detectors are employed in the loops within loops which synthesize the output signal; the benefit gained by this rather high degree of complexity is an output resolution of 1 kHz (one part in 8 million for a Model 605 having an 8 GHz output bandwidth).

THE SYNTHESIS NETWORK

All output frequencies are synthesized by the output PLL, and are ultimately phase locked to the 10 MHz master reference. The synthesizer can be analyzed as two parallel branches connecting the master reference to the output PLL's reference and variable inputs. The variable branch includes feedback from the output YIG oscillator.

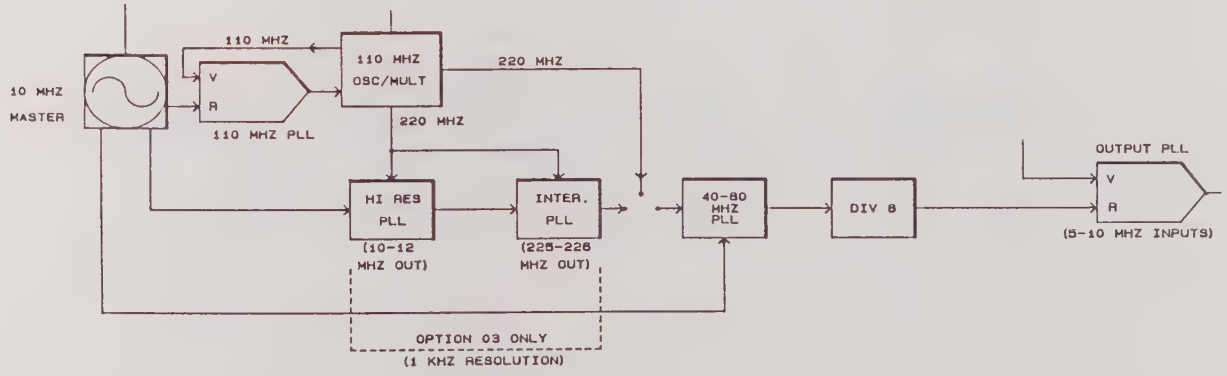


Figure 3.5: The reference branch

THE REFERENCE BRANCH

1 -- 10 MHz master reference (see A12)
2 -- 110 MHz PLL (A12)
3 -- 110 MHz oscillator/multiplier (A113)
4 -- 10-12 MHz PLL (A10)
5 -- intermediate PLL (A9)
6 -- 40-80 MHz PLL (A8)
7 -- divide-by-8 (A7)
8 -- output PLL, reference input (A6)

The master reference is the instrument's 10 MHz timebase (either the built-in oscillator or an externally applied reference signal -- see the 10 MHz input/output circuit located on the A12 PC board).

The 110 MHz PLL is used to phase lock the 110 MHz voltage controlled oscillator (on the A113 board) to the 10 MHz timebase. A sample of the VCO frequency is divided by 11 and applied to the variable input of a phase comparator; the timebase is the reference input. The phase comparator output is used to generate a tuning voltage for the VCO. The PLL increases or decreases the oscillator frequency until the phase detector inputs match. The 110 MHz oscillator/multiplier generates the 220 MHz and 330 MHz reference signals that are required by other circuits, including the 10-12 MHz PLL and the intermediate PLL. It includes a 110 MHz VCO, tuned by the PLL circuit described above, a frequency doubler, and a frequency tripler.

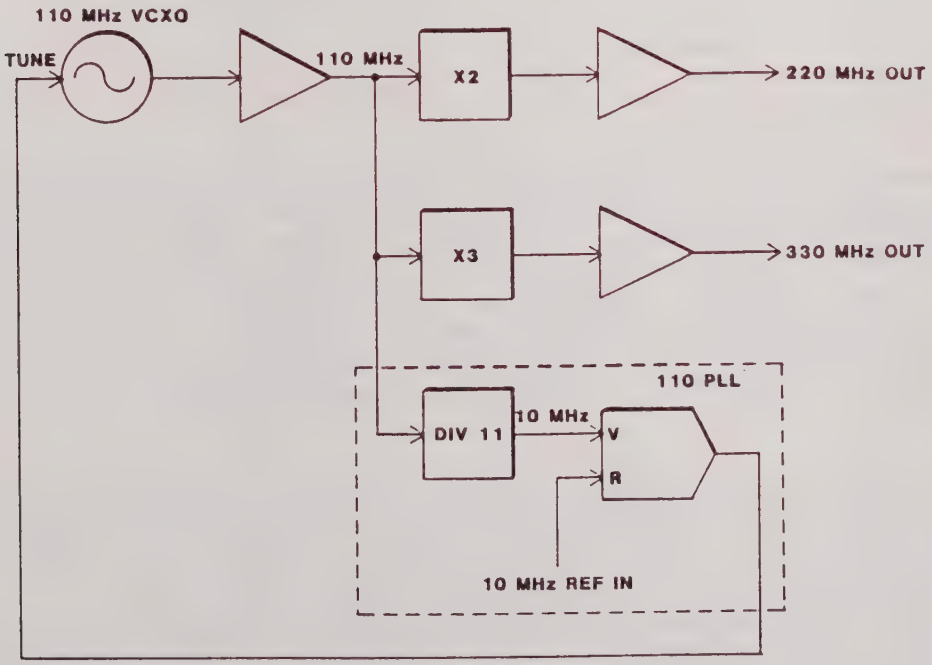


Figure 3.6: 110 MHz Oscillator/Multiplier and Phase Lock Loop

The 10-12 MHz PLL is a programmable source, generating frequencies in 2 kHz increments between 10 and 12 MHz. A 250-300 MHz VCO, with a divide-by-25 circuit on its output, is the source of the 10-12 MHz signal. The VCO is tuned by a phase lock loop circuit, but its output is not fed back directly to the phase comparator because the 250-300 MHz frequency range is too high. Instead, the VCO frequency is applied to a mixer. The other mixer input is the 220 MHz reference signal from A113. The 30-80 MHz IF from the mixer is applied to a programmable divider; the divider output (50 kHz when the loop is locked) is applied to the phase comparator's variable input. The reference input is the 10 MHz timebase, divided by 200 for a fixed 50 kHz reference. The PLL tunes the VCO until the two comparator inputs match. The 10-12 MHz output is used by the intermediate PLL as a reference.

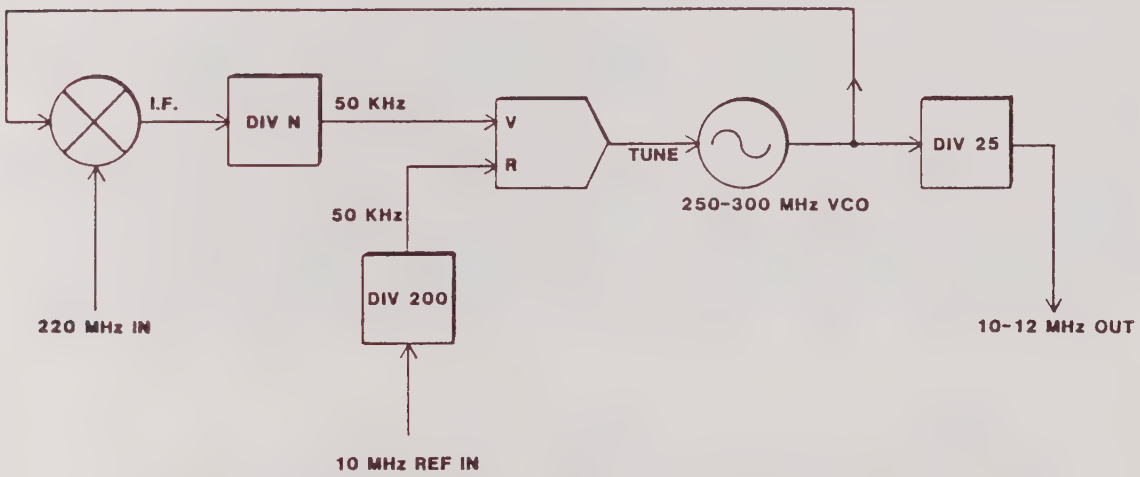


Figure 3.7: 10-12 MHz Phase Lock Loop

The intermediate PLL is a programmable source, generating frequencies in 1 kHz increments between 225 and 226 MHz. A VCO is the source of the 225-226 MHz output. The VCO frequency is fed back to a mixer, where it is combined with the 220 MHz reference input from A113. The resulting 5-6 MHz IF is applied to the variable input of the phase comparator. The 10-12 MHz reference signal from A10 is divided by two and applied to the reference input of the phase detector. The PLL circuit tunes the VCO so as to equalize these two inputs. The 225-226 MHz output is used by the 40-80 MHz PLL as a reference.

The 40-80 MHz PLL is a programmable source, generating frequencies in 1 kHz increments between 40 and 80 MHz. The output frequency is an IF generated by mixing the output of a 145-185 MHz VCO with the 225-226 MHz reference input from the intermediate PLL (A9). The VCO is tuned by a PLL circuit; its output is fed back through a frequency divider having a fixed divisor of four, followed by a programmable divider which reduces the feedback signal to 250 kHz and applies it to the variable input of the phase detector. The reference input to the phase detector (also 250 kHz) is obtained by dividing the 10 MHz reference input by 40. The phase lock loop circuit tunes the VCO until these two inputs match.

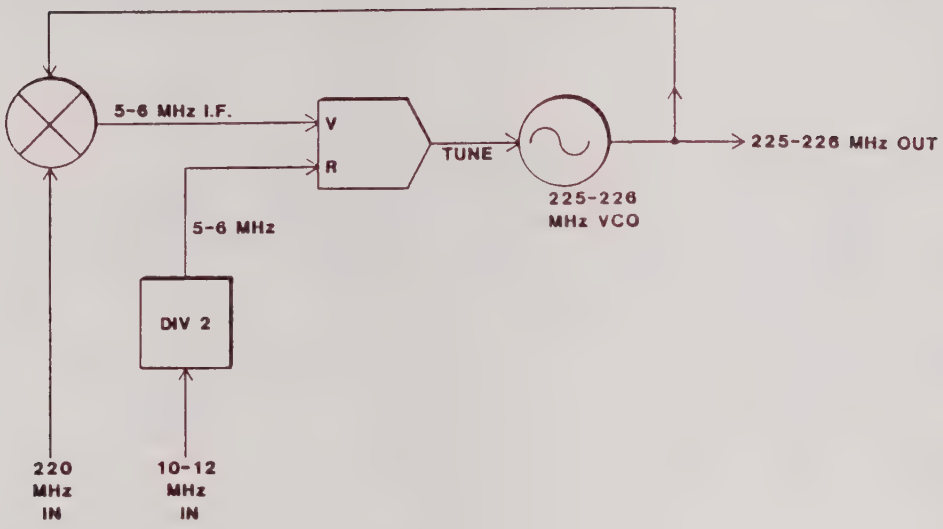


Figure 3.8: Intermediate Phase Lock Loop

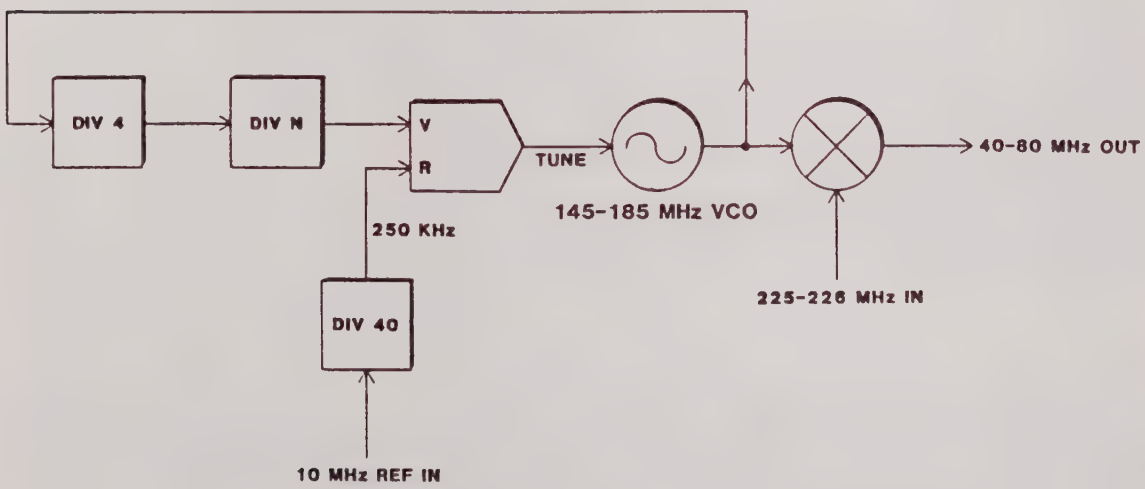


Figure 3.9: 40-80 MHz Phase Lock Loop

The divide-by-8 circuit is a binary frequency divider which accepts the 40-80 MHz reference and divides it by 8; the output signal (a 5-10 MHz reference programmable in 0.125 kHz increments) is the reference input to the output PLL circuit.

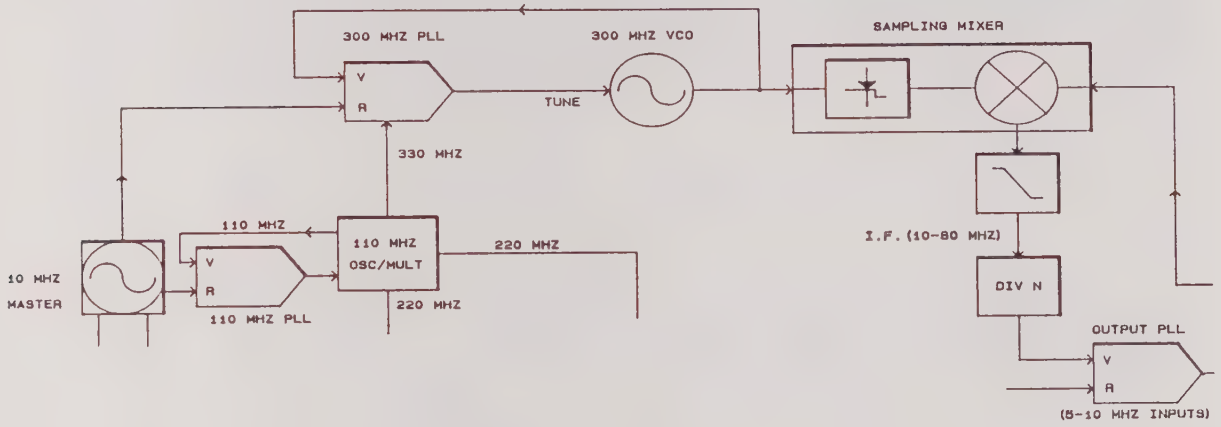


Figure 3.10: The Variable Branch

THE VARIABLE BRANCH

This branch consists of circuits in the following sequence:

1 -- 10 MHz master reference (see A103)
2 -- 110 MHz PLL (A12)
3 -- 110 MHz oscillator/multiplier (A113)
4 -- 300-350 MHz PLL (A11)
5 -- 300-350 MHz VCO/driver (A104)
6 -- sampling mixer/IF amplifier (A104)
7 -- divide-by-N (A7)
8 -- output PLL, variable input (A6)

The 10 MHz master reference and the 110 MHz PLL are the same circuits used in the reference branch.

The 110 MHz oscillator/multiplier also supplies a 220 MHz (or 330 MHz, in some models) reference input to the 300-350 MHz PLL.

The 300-350 MHz PLL is a programmable source, generating frequencies in 1 MHz steps between 300 and 350 MHz. A VCO, tuned by a phase lock loop circuit, generates the output frequency. The VCO frequency is mixed with the input from A113 (220 or 330 MHz) to produce an IF which is then applied to a

programmable divider; the IF is reduced to 1 MHz and applied to the variable input of the phase detector. The reference input, also 1 MHz, is obtained by dividing the 10 MHz reference input by 10. The PLL tunes the VCO until these two phase detector inputs match.

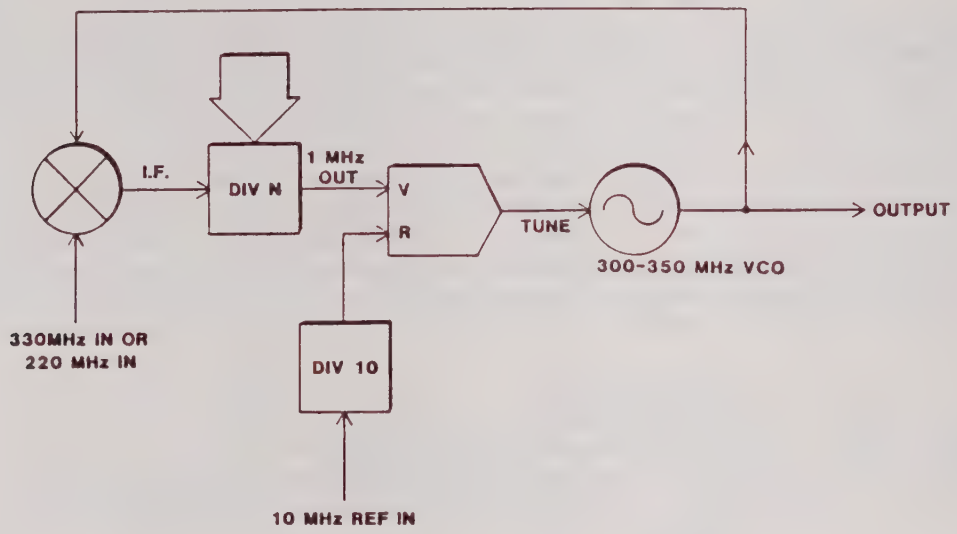


Figure 3.11: 300-350 MHz PLL/VCO

The 300-350 MHz VCO/driver is controlled by the 300-350 MHz PLL. Its output is amplified and used to drive the multiplier input of the sampling mixer.

The sampling mixer has a step recovery diode multiplier on one of its inputs (the input driven by the 300-350 MHz VCO). The multiplier produces a series of frequency components that are harmonics of the input. The other input to the mixer is a signal coupled from the output of the YIG oscillator. The mixer combines the YIG frequency with the harmonics of the VCO frequency, yielding a great variety of intermediate frequency (IF) components. The IF output is amplified and filtered in order to pass only IFs within a 10-80 MHz range. In this way the output is limited to a single IF component, derived from the difference between the YIG frequency and one of the VCO's harmonics. The IF (a signal programmable in 1 kHz increments between 10 and 80 MHz) is applied to the divide-by-N circuit.

The divide-by-N circuit is a programmable frequency divider; the computer programs it to divide the IF by 2, 4, or 8 in order to produce an output frequency in the range of 5 to 10 MHz (in increments equal to 1 kHz divided by "N"). The output is applied to the variable input of the output phase lock loop. The amplified and filtered phase detector output of the PLL is further amplified by the FM driver circuit (see A103) before being applied to the YIG's FM coil. The YIG is tuned in order to adjust the sampling mixer IF and thus equalize the reference and variable inputs to the PLL.

The various programmable frequencies are set by the computer, in accordance with a complex algorithm, to produce the requested output frequency.

DOWNCONVERTER

Instruments which include the .01-2 GHz range must include a downconverter circuit, because these frequencies are below the normal frequency range of YIG oscillators. The downconverter is a low frequency synthesizer; it mixes the instrument's YIG frequency with the fixed output of a local oscillator, yielding an intermediate frequency output in the range of .01-2 GHz. NOTE: The actual transition point from the downconverter range to the YIG range occurs at 1.977 GHz (1.976080 in instruments with 1 kHz resolution), but the downconverter range is usually stated as ".01-2" for the sake of convenience).

The downconverter is interposed between the output of the RF module and the 10 dB step attenuator. During operation below 2 GHz, a switch in the output path diverts the RF output from the module to the downconverter; the low frequency signal synthesized by the downconverter is returned to the switch and furnished to the step attenuator. Most of the elements of the downconverter circuit are housed within a single module.

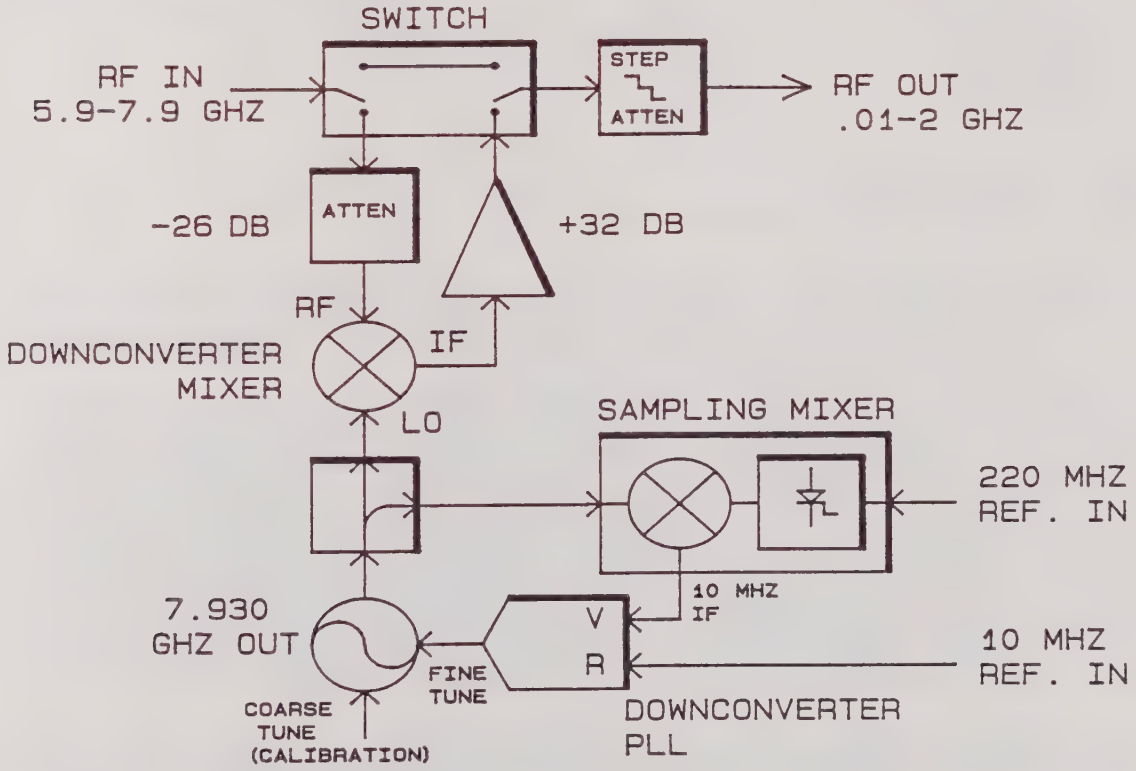


Fig. 3.12: The Downconverter Circuit

The input from the RF module has an approximate range of 5.9 to 7.9 GHz. Following the downconverter switch, this input is attenuated (about -26 dB) and furnished to the downconverter mixer. The other input to the mixer is a fixed 7.930 GHz local oscillator input. The LO is phase-locked to the instrument's 10 MHz timebase in order to maintain a stable 7.930 GHz output. The IF output from

the mixer is equal to the difference between the RF and LO inputs (e.g., 1.000 GHz when the RF input is 6.930 MHz, and .01 GHz when the RF input is 7.920 GHz). The computer tunes the YIG oscillator to the RF frequency that will yield the desired IF output from the downconverter mixer. The IF is amplified (about +32 dB) and returned to the downconverter switch.

The phase lock loop which controls the 7.930 GHz LO operates as follows. A sample of the LO frequency is applied to a sampling mixer (a mixer with a step-recovery diode multiplier on one input). The other input to the sampling mixer (the multiplier input) is the 220 MHz reference signal from the oscillator/multiplier circuit (PC board A113). The multiplier produces numerous harmonics of the 220 MHz reference; the 36th harmonic (7.920 GHz) combines with the 7.930 GHz LO to produce a 10 MHz intermediate frequency. This 10 MHz IF is fed back to the downconverter phase lock loop (PC board A119, which is mounted beside the downconverter module on the underside of the instrument). The PLL circuit compares the 10 MHz IF to the 10 MHz timebase and fine-tunes the local oscillator in order to achieve and maintain phase lock.

Instrument functions, including level control and modulation, operate normally in the downconverter range (the leveling and modulation of the RF input to the downconverter mixer is reflected in the mixer's IF output). The frequency synthesis process is also normal, except that the YIG oscillator is tuned to a frequency equal to 7.930 GHz minus the actual output frequency.

SECTION FOUR

CALIBRATION AND TESTING

4.1 CALIBRATION PROCEDURE

4.1.1 Required Test Equipment

Frequency Counter covering output frequency range of Model 605; time base accuracy better than 1 part in 10E9; IEEE-488 interface.

Computer/Controller (any unit equipped with IEEE-488 interface, such as HP9825 or HP85).

Power Meter/Sensor (HP436A meter with 8485A sensor, or equivalent).

Spectrum Analyzer (HP8566 or equivalent, with external mixers as required).

Oscilloscope (Tektronix 2465 or equivalent).

Negative Detector, zero-bias Schottky, .5 mV/uW, .01-18 GHz, output capacitance 30 pF or less (Wiltron 70KB50 or equivalent).

50 ohm termination (Tektronix 011-0049-01 or equivalent).

Low Distortion Sine Wave generator (Wavetek 182A or equivalent).

4.1.2 Warm-up Time

A 20-minute warm-up is required before performing the calibration procedure (one hour for units with Option 06). Place the unit under test (UUT) in self-test mode during warm-up. The instrument covers should be removed from the UUT prior to warm-up, and should be left off during the procedure.

4.1.3 Master Oscillator Calibration

4.1.3.1 Connect the 10 MHz output on the rear panel of the UUT to the oscilloscope vertical input. Adjust oscilloscope for a mid to full scale display; .1 ms/cm timebase setting.

4.1.3.3 Connect the output from the frequency standard (10 MHz) to the oscilloscope external trigger input and adjust the oscilloscope to trigger on this signal.

4.1.3.4 The timebase oscillator is mounted on the A32 PC board. Turn the frequency adjustment (located inside the oscillator housing, under a screw-in cap) until the scope display stands still. Use the X10 expander for more resolution.

NOTE: If Option 06 (High Stability Timebase) is installed, the oscillator housing contains two adjustments. Turn the "FINE" adjustment to the middle of its range before using the "COARSE" adjustment to set the timebase frequency; then return to the "FINE" adjustment to complete the calibration.

4.1.3.5 Replace the screw-in cap on the oscillator.

4.1.4 Output YIG Oscillator Tuning

4.1.4.1 CALIBRATION FREQUENCIES: The frequency range of the output YIG oscillator is determined by the frequency range of the instrument, excluding the "downconverter" range (below 2 GHz). The MIN and MAX calibration frequencies should be within about 1 GHz of the limits of the YIG oscillator's range (e.g., a 2-8 GHz YIG oscillator would be calibrated at MIN = 3 GHz and MAX = 7 GHz). A .01-8 GHz instrument would also be calibrated at 3 and 7 GHz, because frequencies below 2 GHz are not part of the YIG range.

4.1.4.2 Set UUT for 0 dBm output power, all modulation off, and connect RF output to the frequency counter input.

4.1.4.3 Connect the oscilloscope to the test point on the Output PLL board (A6). Set oscilloscope as follows: 1 V/cm, GND centered, DC coupled.

4.1.4.5 Set UUT to the MIN frequency. Adjust the MIN pot (R4) on the YIG driver board (A13) so that the test point voltage is zero, $\pm$.5V. Monitor the frequency counter to verify that the RF output frequency is correct (over-adjustment of the MIN pot can cause frequency error).

4.1.4.6 Set UUT to the MAX frequency. Adjust the MAX pot (R9) on the YIG driver board (A13) so that the test point voltage is zero, $\pm$.5V. Monitor the frequency counter to verify that the RF output frequency is correct (over-adjustment of the MAX pot can cause frequency error.

4.1.4.7 Repeat 4.1.4.5 and 4.1.4.6 as needed.

4.1.4.8 Starting at the minimum output frequency (excluding the range below 2 GHz, if present), observe the test point voltage at frequencies across the instrument's range in 100 MHz increments. Verify that the test point voltage is at zero volts, +1V, throughout the range. Repeat 4.1.4.5 and 4.1.4.6 if necessary to bring the test point voltage within range.

4.1.5 **Downconverter** (for units containing the .01-2 GHz band)

4.1.5.1 Monitor TP1 on the Downconverter PLL (PC board A119) with the oscilloscope. Set UUT to 1 GHz. Adjust 'COARSE TUNE' (R29, A119) to read 0V $\pm$2V at the test point.

4.1.6 Modulation Meter Zero Adjustment

4.1.6.1 With all modulation OFF, adjust 'DISP ZERO' (R82 on PC board A5) for a modulation meter reading of 0.00 (FM MHz position) and 00.0 (AM % position).

4.1.7 RF Output Amplitude Calibration

4.1.7.1 With all modulation off, set frequency to "MIN" (see 4.1.4 above). Monitor the UUT RF output with the power meter.

4.1.7.2 Set the output level to -4 dBm, and adjust the "-4" pot on the Level Control board (R43, PC board A5) for a power meter reading of -4 dBm.

4.1.7.3 Set the output level to +4 dBm, and adjust the "+4" pot (R52, PC board A5) for a reading of +4 dBm on the power meter.

4.1.7.4 Repeat 4.1.7.2 and 4.1.7.3 as required.

4.1.8 Amplitude Modulation Function

4.1.8.1 Set UUT:
Pulse -- Off
FM -- Off
AM -- 1 kHz, Max (vernier CW)

4.1.8.2 Monitor pin 9, PC board A118 with oscilloscope; adjust 'SINE' (R20, A118) for a 2 Vpp sine wave. Adjust 'M CAL' (R23, A5 board) for a reading of 99.0 on the modulation meter (AM %).

4.1.9 Frequency Modulation Function

4.1.9.1 Set UUT:
Pulse -- Off
AM -- Off
FM -- 1 kHz, MAX (vernier CW)

4.1.9.2 With the FM vernier set to MAX, the mod meter reading should be >5 MHz. Monitor A118 pin 10 with the oscilloscope, and adjust A118 R21 for a 2 Vpp triangle wave.

4.1.10 Pulse Modulation Function

4.1.10.1 Set UUT:
AM -- Off
FM -- Off
Pulse -- 1 kHz
Level -- +5 dBm
Output Frequency -- MIN

4.1.10.2 Place a detector on the RF output of the UUT. Apply the detector's output to the oscilloscope, terminated by a 50 ohm load. Set the oscilloscope to 5 mV/div and observe the 1 kHz square wave on the detector's output.

4.1.10.3 Adjust the 'DUTY' pot (A118 R19) for a 50% duty cycle.

4.1.10.4 Adjust the 'FREQUENCY' pot (A118 R33) for a frequency of 1.000 kHz, ±5 Hz.

4.1.10.5 Repeat 4.1.10.3 and 4.1.10.4 as needed.

4.1.11 AM Depth

4.1.11.1 Connect the UUT's RF OUT to the spectrum analyzer. Connect the 10 MHz IF output from the spectrum analyzer to the input of the external modulation meter.

4.1.11.2 Set the UUT to an output frequency listed in the test data sheet at the end of this section, at +3 dBm, with all modulation off. Center the output signal on the spectrum analyzer, span 500 kHz, top reference level. Using the volt meter, monitor TP2 on PC board A5 and adjust 'ZERO' (R26, PC board A5) for a reading of 0.0V.

4.1.11.3 Turn the UUT's AM switch to the 1 kHz mode.

4.1.11.4 Set the analyzer to "zero span" (time domain), linear vertical display, video trigger mode; increase the ref level to get the display on the screen. Adjust the AM vernier for an internal modulation meter reading of 50%.

4.1.11.5 Adjust 'AM CAL' (R49, PC board A5) for a 50% reading on the external modulation meter.

4.1.11.6 Using the AM vernier, set the UUT to 20%, then 80% modulation as indicated on the internal modulation meter display. Compare the internal and external meter readings at these settings. If there is a difference of more than 10% between the internal and external meter readings at either setting, repeat the 50% adjustment (4.1.11.5 above) in order to make the internal and external meters agree.

4.1.12 FM Deviation

4.1.12.1 EXPLANATORY NOTE: During frequency modulation, a carrier null (the disappearance or sharp decline of carrier amplitude) occurs for certain values of the modulation index (the ratio of deviation to modulating frequency). The values for which a null occurs are defined by a Bessel function. For example, the 1st null occurs when the value of the modulation index is 2.4048/1, a condition which is met when the deviation is 300 kHz and the

modulation rate is 125 kHz. The 8th null occurs when the modulation index is 24.35245/1 (deviation = 3 MHz, rate = 123 kHz).

4.1.12.2 Apply a sine wave at 123 kHz to the FM EXT IN connector. Adjust the FM vernier for a modulation meter reading of 3 MHz. Connect the UUT RF output to the spectrum analyzer (center, 1 MHz span).

4.1.12.3 Rotate the CAL pot (PC board A6) fully CW (this reduces FM deviation to zero). Adjust the CAL pot slowly CCW, observing the carrier as displayed on the spectrum analyzer; the carrier will fall off at each null. When the 8th null is reached, adjust carefully for the deepest possible 8th null (this sets the FM deviation to 3 MHz).

4.2 PERFORMANCE CHECK

4.2.1 Required Test Equipment

Frequency Counter covering output frequency range of Model 605; time base accuracy better than 1 part in 10E9; IEEE-488 interface.

Computer/Controller (any unit equipped with IEEE-488 interface, such as HP9825 or HP85).

Power Meter/Sensor (HP436A meter with 8485A sensor, or equivalent).

Spectrum Analyzer (HP8566 or equivalent, with external mixers as required).

Oscilloscope (Tektronix 2465 or equivalent).

Negative Detector, zero-bias Schottky, .5 mV/uW, .01-18 GHz, output capacitance 30 pF or less (Wiltron 70KB50 or equivalent).

50 ohm termination (Tektronix 011-0049-01 or equivalent).

Pulse Generator (Wavetek 802 or equivalent).

Low Distortion Sine Wave generator (Wavetek 182A or equivalent).

FM Test Fixture (described in this procedure).

Distortion Analyzer (HP 339A or equivalent).

Modulation Meter (Wavetek 4101 or equivalent).

Directional Detector (1-18 GHz, 10 dB coupling factor with integral negative detector on coupled port (Krytar 1821S or equivalent). Use with 50 ohm coaxial cable, SMC female to BNC male.

4.2.2 Warm-Up Time

A 20 minute warm-up period is required prior to the performance check (one hour for units with Option 06). The UUT should be placed in self test mode during the warm-up period.

4.2.3 Frequency Range

4.2.3.1 Connect the UUT's RF output to the frequency counter. Run the UUT self-test routine in 100 MHz steps (set the frequency switches to 90100.000) and monitor the counter to verify frequency accuracy.

4.2.4 Output Amplitude

4.2.4.1 Connect the UUT's RF output to the power meter. Run the UUT self-test routine in 50 MHz steps (90050.000) at the maximum output power specified for the instrument, and monitor the power meter to verify that the output power level is within specification across the frequency range of the UUT.

4.2.4.2 Perform the UUT self-test as in 4.2.4.1 above, at 0 dBm and at -4 dBm.

4.2.5 Frequency Accuracy and Resolution

4.2.5.1 Check each frequency digit from 0 to 9 (as applicable) for correct UUT display and counter reading.

4.2.6 Spectral Purity/Step Attenuator

4.2.6.1 Perform spectral purity test as required by Test Data Sheet.

4.2.6.2 Perform On/Off test as follows:

Set HP-8566:	Set UUT:
Span = 200 kHz	Pulse Rate = Ext
Center & Top Ref Level	Pulse Input = 50 Hz Square Wave
Span = 0 Hz	
VBW = 300 Hz	
Trigger = Video	

Measure the difference (in dB) between "on" and "off" RF levels (top and bottom of pulses).

4.2.6.3 Perform 10 dB step attenuator test as follows:

Set HP-8566:	Set UUT:
Span = 50 kHz	RF level = -5 dB
Center & Top Ref Level	Frequency = MIN + 47 MHz
	Modulation = off

Decrement the RF level in 10 dB steps, and verify that the RF level is accurate to within 2 dBm at each step. At -65 dBm, change the span setting on the HP-8566 to 200 Hz and step the reference level down five times (to about -50 dBm). Continue the test to -105 dBm. If more range is needed, set the HP-8566 attenuator to 0 dB.

4.2.7 AM Functions

4.2.7.1 Set UUT:

Pulse - off	Frequency - any
FM - off	Level +5
AM - 1 kHz, Max (Vernier CW)	

4.2.7.2 Connect the detector to the UUT's RF output, and monitor the detector's output with the oscilloscope (5 mV/div, 50 ohm termination). Verify a 1 kHz sine wave on the oscilloscope. Verify a modulation meter reading of >90% (AM % position).

4.2.7.3 Set the front panel AM switch to the EXT position. Apply a sine wave at 10 kHz, 1 Vpp, to the AM EXT IN connector. Verify a reading of 70%, ±20%, on the Modulation Meter

4.2.8 FM Functions

4.2.8.1 Set controls as follows:

Set UUT:

Pulse - off	Frequency - any
AM - off	Level +5
FM -1 kHz, Max (Vernier CW)	

4.2.8.2 Attach FM test fixture (see 4.1.9.1 herein) to RF out. Use one of the frequencies listed on FM test fixture. Scope FM fixture output 5mV/div AC. Verify 1 kHz triangle wave and a Mod Meter reading of >5.0 MHz (FM MHz).

4.2.8.3 Set the Front Panel FM switch to the EXT position. Apply a sine wave at 10 kHz (2 VP-P into 50 ohms) to the FM EXT in BNC. Verify a Mod Meter reading of >5 MHz (FM MHz) and a 10 kHz sine wave on fixture's output.

4.2.9 Pulse Modulation Functions

4.2.9.1 Set control as follows:

Set UUT:

AM - Off	Level +5dB
FM - Off	RF Frequency MIN
Pulse - 1 kHz	

4.2.9.2 Place a detector on the UUTs RF output. Apply the detector's output to the oscilloscope terminated by a 50 ohm load. Monitor the detector's output at 5mV/DIV. Verify a 1 kHz square wave ±10 Hz, on the detectors output.

4.2.9.3 Set pulse modulation switch to the EXT position. Apply a 10 kHz square wave (TTL Levels) to the pulse EXT in BNC and verify 10 kHz modulation waveform is present on the detectors output.

4.2.10 Remote Modulation

4.2.10.1 Attach UUT to instrument controller via the IEEE-488 interface bus. Set UUT Address to 6.

4.2.10.2 Initialize UUT by sending the following command:

Output 706 "FAXXXX, Level 0" (where "XXXX" represents any valid frequency).

4.2.10.3 Send the following commands and verify appropriate AM functions:

OUTPUT 706 "AM INT" (Internal AM 1 kHz sinewave)
OUTPUT 706 "Panel AM" (Front Panel AM depth vernier activated)
OUTPUT 706 "Preset AM" (Preset AM depth pot activated)
OUTPUT 706 "AM EXT" (External AM)
OUTPUT 706 "AM OFF" (AM deactivated)

4.2.10.4 Send the following commands and verify appropriate FM functions:

OUTPUT 706 "FM INT" (Internal FM 1 kHz triangle)
OUTPUT 706 "Panel FM" (Front Panel FM deviation vernier activated)
OUTPUT 706 "Preset FM" (Preset FM deviation pot activated)
OUTPUT 706 "FM EXT" (External FM)
OUTPUT 706 "FM OFF" (FM deactivated)

4.2.10.5 Send the following commands and verify appropriate pulse modulation functions:

OUTPUT 706 "Pulse INT" (Internal pulse modulation 1 kHz)
OUTPUT 706 "Pulse EXT" (External pulse modulation)
OUTPUT 706 "Pulse OFF" (Pulse modulation deactivated)

4.2.11 Pulse Shape

4.2.11.1 Check pulse shape with an external 50 kHz square wave TTL levels, for each frequency shown on the test data sheet as follows (do not include undershoot of <2 dB in measurement).

4.2.11.2 Set controls as follows:

Set UUT:
RF Out - +5 dBm
Pulse - External

4.2.11.3 Adjust RF level and scope to get 5 divisions and centered, 10% and 90% are at +2 and -2 divisions. Verify overshoot and undershoot are <2 dBc.

4.2.11.4 Set pulse switch to off. Verify CW level equals the pulse level, ±1dB.

4.2.11.5 Set pulse switch to EXT. Verify rise time and fall time are within specification and record values. Adjust RF level as required.

4.2.11.6 Repeat 4.2.11.2 through 4.2.11.5 for each frequency shown on the test data sheet.

4.2.12 Miscellaneous Functions

4.2.12.1 Check 'INT CLK 10 MHz' with scope (2 Vpp into 50 ohms).

4.2.12.2 Connect 'INT CLK OUT' to 'EXT CLK IN'; verify UUT unlocks.

EXTERNAL ALC

4.2.12.3 Set EXT ALC to enable position. Verify level display shows "-.----", UUT unleveled.

4.2.12.4 Connect 18 GHz directional coupler/detector to UUT RF Out. Connect detector output to EXT ALC input. Connect power meter to coupler RF output.

4.2.12.5 Adjust RF level switches to read +4 dBm on display. Adjust EXT ALC GAIN to read +4 dBm on power meter.

4.2.12.6 Set RF level switches to read -4 dBm on display. Adjust EXT ALC OFFSET to read -4 dBm on power meter.

4.2.12.7 Repeat 4.2.12.5 and 4.2.12.6 as required.

LEVEL CHECK

4.2.12.8 Connect power meter to UUT RF Out. Set UUT RF Level switches to 0.0 dBm. Increase level setting in .1 dB steps, to +0.9 dBm; verify accuracy on power meter, $\pm$0.1 dB.

4.2.12.9 Increase level setting in 1 dB steps, to 9 dBm; verify accuracy on power meter, $\pm$.2 dB.

4.2.13 AM Performance

4.2.13.1 Connect the UUT's RF OUT to the spectrum analyzer. Connect the 10 MHz IF output from the spectrum analyzer to the input of the external modulation meter. Connect the AF output of the external modulation meter to the input of the distortion analyzer.

4.2.13.2 Set the UUT to an output frequency listed in the test data sheet, at +3 dBm, with all modulation off. Center the output signal on the spectrum anaylzer, span 200 kHz, top ref level.

4.2.13.3 Turn the AM switch to the 1 kHz mode.

4.2.13.4 Set analyzer to "zero span" (time domain), linear vertical display, sweep time 10 ms, video trigger mode, increase ref level to get display on screen. Adjust the AM vernier for an

internal modulation meter reading of 80%. Verify an external modulation meter reading of 70-90%.

4.2.13.5 Adjust the AM vernier for an internal modulation meter reading of 20%, and verify an external modulation meter reading of 10-30%.

4.2.13.6 Adjust the AM vernier for an internal modulation meter reading of 50%, and verify an external modulation meter reading of 40-60%.

4.2.13.7 Verify a distortion meter reading within specification. Record in table on data sheet. Repeat 4.2.13.2 - 4.2.13.7 for other frequencies in table.

4.2.13.8 Attach a detector to the UUT's RF OUT connector. Monitor the detector's signal with the oscilloscope (terminate the detector into a 50 ohm load). Set the scope to 5 mV/div.

4.2.13.9 Apply an external sinewave (2 Vpp) to the AM BNC, RF output at +5, AM at External. Adjust the function generator vernier to see a waveform 6 divisions high on the scope (for that setting the internal modulation meter reading should be roughly 35%).

4.2.13.10 Vary function generator rate across the 10 Hz - 50 kHz range, and verify that the amplitude of the detector output waveform is between 4 and 8 divisions throughout this range.

4.2.14 FM Performance

FM METER ACCURACY

4.2.14.1 EXPLANATORY NOTE: During frequency modulation, a carrier null (the disappearance or sharp decline of carrier amplitude) occurs for certain values of the modulation index (the ratio of deviation to modulating frequency). The values for which a null occurs are defined by a Bessel function. For example, the 1st null occurs occurs when the value of the modulation index is 2.4048/1, a condition which is met when the deviation is 300 kHz and the modulation rate is 125 kHz. The 8th null occurs when the index is 24.35245/1 (deviation = 3 MHz, rate = 123 kHz).

4.2.14.2 Apply a sine wave at 123 kHz to the FM EXT IN connector. Set the FM vernier fully CCW. Connect the UUT RF output to the spectrum analyzer (center, 1 MHz span).

4.2.14.3 Adjust the FM vernier slowly CW, observing the carrier as displayed on the spectrum analyzer; the carrier will fall off at each null. When the 8th null is reached, adjust carefully for the deepest possible 8th null (this sets the FM deviation to 3 MHz).

4.2.14.4 Verify an internal modulation meter reading of 3 MHz ±10%.

4.2.14.5 Change the rate of the modulation input to 125 kHz. Set the FM vernier fully CW, then adjust the vernier slowly CW until the FIRST null is reached.

4.2.14.6 Verify an internal modualtion meter reading of .30 MHz ±10%.

FM DEVIATION

4.2.14.7 EXPLANATORY NOTE: Testing of FM deviation requires that a special test fixture be assembled. The recommended FM test fixture includes an RF splitter, two delay lines of unequal length, and an RF mixer. The RF splitter should have 50 ohm input and output impedance, no more than 3 dB insertion loss, and a range of 2-18 GHz (Narda Power Divider Model 4426-2 or equivalent). The delay lines should be made of a short piece of .141 inch semi-rigid coax, about 4.8 inches in length, and a longer piece of .085 inch semi-rigid coax, about 4 feet in length and rolled into a coil. The RF mixer should have an input range (RF and LO) of 2-18 GHz and an IF range of 0 to 500 MHz (Time DXM511-1 or equivalent). The RF output of the UUT is divided by the splitter into two signals. One splitter output is connected to the mixer LO input by the long coax. A 3-foot soft coax with SMA male and BNC female connectors may be used to connect the mixer output to the oscilloscope. The two splitter outputs are unequally delayed. For certain "null" frequencies which may be identified by experiment, the mixer will produce a DC voltage near zero. If the instrument's RF output is frequency modulated, the mixer output voltage will change, and the voltage variation will be proportional to FM deviation. The polarity of the voltage change may be either directly or inversely related to the direction of frequency deviation. When voltage levels have been established for different frequencies, the mixer output can be monitored on an oscilloscope to provide a continuous display of FM deviation.

4.2.14.8 Connect the FM test fixture to the RF OUT connector of the UUT. Monitor the mixer output with the oscilloscope (5 mV/div). Set the UUT to a null frequency (that is, to a frequency for which the mixer output voltage is zero); +5 dBm out, no modulation.

4.2.14.9 Establish the voltages at 5 MHz above and 5 MHz below the null frequency. Adjust the oscilloscope gain and the UUT output power level (near +5 dBm) in order to place the null point at the center of the screen and the 5 MHz deviation points at 3 divisions above and 3 divisions below the null point.

4.2.14.10 Apply an external sine wave (1 kHz, 2 Vpp into 50 ohms) to the FM EXT IN connector. Set the UUT to the external FM mode. Adjust the FM vernier to align the peaks of the deviation waveform with the 5 MHz reference points (6 divisions peak to peak, ±0.2 divisions).

4.2.14.11 Verify an internal modulation meter reading of 5 MHz ±10% (FM position).

4.2.14.12 Verify that the displayed peak to peak deviation is greater than 4 divisions, and less than 8 divisions, at all FM rates from 10 Hz to 1 MHz (external mode). This is equivalent to 5 MHz, ±3 dB.

4.2.14.13 Verify that the deviation display reflects the appropriate waveforms in all modes (internal 1 kHz triangle, internal variable triangle, and external).

MODEL 605
TEST DATA SHEET

TESTED BY_____ DATE_____

QUALITY ASSURANCE_____ S/N_____

4.2.2 Frequency Range

4.2.2.2 UUT is locked and leveled throughout its frequency range. _____

4.2.3 Maximum Output Amplitude

4.2.3.1 Maximum power is within specification throughout frequency range. _____

4.2.4 Output Power Accuracy

4.2.4.1 UUT meets the required power accuracy throughout its frequency range (accuracy ±2 dBm, at 0 dBm and -4 dBm) _____

4.2.5 Frequency Accuracy (±1 X 10E-6, or Option 06 spec.) and Resolution

4.2.5.1 1 kHz digit function (Option 03) _____

10 kHz digit function (Option 03) _____

100 kHz digit function (Option 03) _____

1 MHz digit function _____

10 MHz digit function _____

100 MHz digit function _____

1 GHz digit function _____

10 GHz digit function _____

4.2.6 Spectral Purity/Step Attenuator

4.2.6.1 & 4.2.6.2 Record readings for all of the following frequencies the are available in the instrument being tested (table on following page). Frequencies are in MHz. RF level setting is 0 dBm. Ignore kHz digits in units without high resolution. The second harmonic for each frequency is given in brackets (correct only for units with 1 kHz resolution).

FREQUENCY	SECOND HARMONIC (N/A if out of band)	SPURIOUS (SPAN: 1 GHz TO 50 kHz)	NOISE @10 kHz 1 Hz BW	LINE/FAN SPURS	ON/OFF RATIO
Spec:	≤ -40 dB	≤ -55 dB	≤ -75 dB	≤ -45 dB	≥ 80 dB
411.226 [822.452]	_____	_____	_____	_____	_____
1333.288 [2666.576]	_____	_____	_____	_____	_____
2409.976 [4819.952]	_____	_____	_____	_____	_____
3536.171 [7072.342]	_____	_____	_____	_____	_____
4988.132 [9976.264]	_____	_____	_____	_____	_____
5447.742 [10895.484]	_____	_____	_____	_____	_____
9182.433 [18364.866]	_____	_____	_____	_____	_____
12317.392	n/a	_____	_____	_____	_____
15421.056	n/a	_____	_____	_____	_____
17361.522	n/a	_____	_____	_____	_____

4.2.6.3 10 dB Step Attenuator, accuracy ± 2 dB _____

4.2.7 AM Functions

4.2.7.2 AM Sine wave, fixed 1.000 kHz _____

4.2.7.3 External AM _____

4.2.8 FM Functions

4.2.8.2 FM Triangle wave, fixed 1.000 kHz _____

4.2.8.3 External FM _____

4.2.9 Pulse Modulation Functions

4.2.9.2 Internal Pulse Rate (1 kHz fixed) _____

4.2.9.3 External Pulse Function _____

4.2.10 Remote Modulation

4.2.10.3 Remote AM _____

4.2.10.4 Remote FM _____

4.2.10.5 Remote Pulse Modulation _____

4.2.11 Pulse Shape

4.2.11.1. Record readings for all of the following frequencies that are available in the instrument being tested.

FREQUENCY	RISE TIME	FALL TIME
spec:	≤ 25 ns	≤ 25 ns
1500	_____	_____
2500	_____	_____
4500	_____	_____
6500	_____	_____
8500	_____	_____
11500	_____	_____
13500	_____	_____
17500	_____	_____

4.2.12 Miscellaneous Functions

4.2.12.1. 10 MHz INT CLK Output, 2 Vpp into 50 ohms _____

4.2.12.2 10 MHz EXT CLK _____

4.2.12.5 External ALC _____

4.2.12.8 Level check (1 dB & .1 dB increments) _____

4.2.13 AM Depth and Distortion; FM deviation

4.2.13.2 Record readings for all of the following frequencies that are available in the instrument being tested.

FREQUENCY	AM DEPTH (%)	AM DISTORTION
spec:	50% ± 10%	≤ 5% @ 1 kHz
1500	_____	_____
2500	_____	_____
4500	_____	_____
6500	_____	_____
8500	_____	_____
11500	_____	_____
13500	_____	_____
17500	_____	_____

4.2.14.12 FM Deviation 5 MHz ± 3 dB _____

SECTION FIVE

MAINTENANCE

5.0 Introduction

During the warranty period of the instrument, it is recommended that no user initiated service work be performed without prior communication with the factory (or our authorized representative). Often the problem can be readily isolated to a particular plug-in module, for which a replacement can be sent.

C A U T I O N

This instrument contains many MOS and CMOS devices; be sure to use appropriate anti-static procedures whenever it is necessary to handle them.

The larger integrated circuits are plugged into locking sockets. To release the locking mechanism, insert a small screwdriver in the slot at the "pin 1" end of the socket. Press down gently and tilt the screwdriver toward the socket. The IC may now be removed easily. To insert, just press the IC firmly into place, making certain all pins are straight and centered in their guides.

Never remove an IC from its socket unnecessarily.

It may become necessary to work on the interior of the instrument while it is plugged in and power is on; circuit boards may be placed on extender cards for the purpose of observing their operation within the system. However, circuit boards and other electronic devices must not be inserted into or removed from the instrument while power is being applied to it! Always unplug the instrument before making such changes.

5.1 Troubleshooting Procedure

If the instrument appears to be operating abnormally, the following procedure may be used to isolate the problem and identify the probable cause. Nine major areas of potential failure are discussed:

5.1.1 -- Instrument does not function; displays are blank or erratic.
5.1.2 -- No measurable output power.
5.1.3 -- RF output is at wrong power level.
5.1.4 -- RF output frequency is unlocked.
5.1.5 -- RF output is locked, but at the wrong frequency.
5.1.6 -- FM malfunction.
5.1.7 -- AM malfunction.
5.1.8 -- Pulse malfunction.
5.1.9 -- IEEE-488 interface malfunction.

Each problem area is analyzed with reference to the troubleshooting notes included in section 5.2. (e.g., "see note 5").

Refer to 5.1.9 (IEEE-488 interface malfunction) for any problem which occurs only while the instrument is under remote control.

Some improper control settings will cause an error message to be displayed; see page 1-6 for a list of error messages.

5.1.1 GENERAL FAILURE

Symptoms: The instrument does not respond appropriately to commands given via the front panel controls or IEEE-488 interface; the readouts are blank, erratic, or fixed in one state.

RECOMMENDATIONS:

Check power supplies (see note 1).

Check computer (see note 2).

5.1.2 LOSS OF RF OUTPUT

Symptoms: No measurable power is present at the output connector, regardless of the RF level setting. The front panel 'LEVEL' indicator may or may not be lit.

RECOMMENDATIONS:

Check power supplies (see note 1).

Check downconverter switch, if installed (see note 33).

Check 10 dB step attenuator (see note 3).

Check modulator (see note 4).

Check YIG oscillator (see note 5).

5.1.3 INCORRECT OUTPUT LEVEL

Symptoms: Output power is at a level other than that selected by the RF level setting. The front panel 'LEVEL' indicator may or may not be lit.

RECOMMENDATIONS:

Before proceeding, be sure that the selected RF level is within the capability of the instrument. Although the instrument must meet a maximum power specification, the actual maximum will be somewhat in excess of this, and will vary for different frequencies. When exceeding the normal power range, the 'LEVEL' indicator may go out and the instrument's RF output may fall below the level requested.

Check power supplies (see note 1).

If level error is a 10 dB multiple (e.g., -20 dBm instead of +10 dBm), check 10 dB step attenuator (see note 3).

Check downconverter switch, if installed (see note 33).

Check leveler (see note 6).

Check detector (see note 7).

Check level control circuit (see note 8).

5.1.4 OUTPUT FREQUENCY UNLOCKED

Symptoms: The 'LOCK' indicator on the front panel is dark whenever any phase lock loop circuit in the instrument is unlocked. The output frequency will drift; the degree of frequency error depends on where the fault is.

RECOMMENDATIONS:

Check power supplies (see note 1).

Determine which loop is unlocked (see note 9). If more than one is unlocked, work backwards from the output PLL as described below.

Check output PLL (see note 10).

Where fault is isolated to the output PLL's variable input, check the 'divide-by-N' circuit on the frequency divider board (see note 11).

Check 300-350 MHz oscillator (see note 12).

Check 300-350 MHz PLL (see note 13).

Check YIG driver (see note 14).

Check 110 MHz oscillator/multiplier (see note 15).

Check 110 MHz PLL (see note 16)

Check 10 MHz master reference (see note 17).

Where fault is isolated to the output PLL's reference input, check the 'divide-by-8' circuit on the frequency divider board (see note 18).

Check 40-80 MHz PLL (see note 19).

Check intermediate PLL (see note 20).

Check 10-12 MHz PLL (see note 21).

Check 110 MHz oscillator/multiplier (note 15).

Check 110 MHz PLL (note 16).

Check 10 MHz master reference (see note 17).

If the fault occurs only in the downconverter range (<2 GHz), check the downconverter PLL (see note 34).

5.1.5 OUTPUT LOCKED, BUT FREQUENCY INCORRECT

Symptoms: The 'LOCK' indicator is illuminated; the output frequency is stable, but incorrect.

RECOMMENDATIONS:

The troubleshooting procedure is the same as for the unlocked condition described in section 5.1.4 above. The same circuits are likely to be at fault, even if there is no indication of unlock; the problem may be caused by improper control or reference inputs rather than by complete circuit failure.

5.1.6: FM MALFUNCTION

Symptoms: The instrument does not frequency modulate its RF output in accordance with the operator's commands.

RECOMMENDATIONS:

Check power supplies (see note 1).

Check FM driver (see note 22).

Check output PLL (see note 23).

Check modulation generator (see note 24).

5.1.7: AM MALFUNCTION

Symptoms: The instrument does not amplitude modulate its RF output in accordance with the operator's commands.

RECOMMENDATIONS:

Check power supplies (see note 1).

Check leveler (see note 25).

Check level control (see note 26).

Check modulation control (see note 27).

5.1.8: PULSE MODULATION MALFUNCTION

Symptoms: Instrument does not pulse modulate its RF output in accordance with the operator's commands.

RECOMMENDATIONS:

Check power supplies (see note 1).

Check pulse modulator (see note 28).

Check modulation generator (see note 29).

5.1.9: IEEE-488 INTERFACE MALFUNCTION

Symptoms: Instrument does not respond appropriately to commands sent via the interface, or exhibits a particular malfunction (see 5.1.1 through 5.1.8 above) only while under remote control.

RECOMMENDATIONS:

Check power supplies (see note 1).

Check GPIB address (see note 30).

Verify that commands used are appropriate to this instrument (see note 31).

Check IEEE-488 circuit (see note 32).

5.2 TROUBLESHOOTING NOTES

NOTE 1 -- POWER SUPPLIES

This is the common denominator among malfunctions of all types. Because the instrument has many regulated supplies, and they are not all used by all circuits, it is possible for the failure of a single supply to disable only a part of the system. For this reason power supply voltages should be checked whenever there is an instrument malfunction, even though the malfunction may seem too limited or specialized to have such a cause.

The power supply circuit board (A101) is located at the rear of the instrument; supply voltages may be measured at its terminals. The individual supplies are:

+5 volts (used by the computer, TTL-type control logic, etc.)

-5.2 volts (used by ECL-type high speed logic circuits, frequency dividers, etc.)

+24 volts (this unregulated supply is used to drive the relays in the 10 dB step attenuator and the cooling fan)

+18 volts #1, the first of two independent +18 supplies (furnishes the positive voltage needed by amplifiers, drivers, and other devices; secondary regulators on the individual circuit boards convert this supply to a lower voltage where necessary)

+18 volts #2, the second of the two independent +18 supplies (furnishes the positive voltage required by the YIG oscillator tuning coil)

-18 volts (furnishes the negative voltage needed by amplifiers, drivers, and other devices; secondary regulators on the individual circuit boards convert this supply to a lower voltage where necessary)

+35 volts (used by the fluorescent display drivers)

7.5 VAC (the only AC supply; used by the fluorescent display heaters)

+15 volts (used by the YIG oscillator, and the downconverter if installed)

Instruments in which option 06 (the high stability timebase) is installed have an additional +15 volt supply; this timebase supply is independent of the power switch, and should be "on" whenever AC power is applied to the instrument.

CORRECTIVE ACTION

Check the line fuse; replace it if it is open. If the new fuse opens, check the power supply primary and secondary circuits.

If any supply output is at an incorrect voltage, remove all plug-in circuit boards. If the overload ceases, replace the boards one at a time to isolate the fault. If the overload persists, open the supply regulator output and verify regulator input and output voltages.

NOTE 2 -- THE COMPUTER

All instrument functions are controlled by the computer, and a general computer failure will lead to a general system failure. The computer is based on the Motorola 6809 microprocessor. It uses a bus architecture which corresponds on a one-to-one basis with the signals from and to the 6809 chip itself, with two exceptions: the DMA/BREQ signal into the 6809 is not used, and the three high order address lines from the 6809 are decoded (on the CPU board) into eight page-lines for the bus.

CORRECTIVE ACTION

Four circuit boards house the computer:

A1 -- This is the Display PIA board, which acts as an interface between the microprocessor and other devices, including the front panel readouts.

A2 -- This is the Memory board, which holds the ROM devices in which the instrument's operating software is stored, as well as the RAM chips used by the computer for temporary data storage.

A3 -- This is the IEEE-488 board; it includes the circuits which act as an interface between the computer and the remote control bus. The board also houses circuits through which the computer controls the instrument's digital to analog converters.

A4 -- This is the CPU board, which houses the microprocessor and some of the control logic through which it runs the instrument.

When a computer failure is suspected, the best way to troubleshoot the system is to isolate the problem to board level by substituting known good PC boards. If the problem persists with four known good boards, the problem is most likely on the computer bus board (the motherboard) into which the computer boards are plugged. Many computer problems are caused by dirt on the connections between these boards.

If the computer seems to have become "lost", it can be reset either by pressing the reset button on the CPU board (A4) or by turning the power switch off and on.

NOTE 3 -- 10 dB STEP ATTENUATOR

The programmable attenuator is capable of attenuating the RF output by as much as 110 dB; if the output is not at the desired power level, the cause may be that the attenuator is improperly set. Note that the attenuator is outside of the leveling loop, and therefore the leveling system cannot detect, or compensate for, attenuator errors.

CORRECTIVE ACTION

The programmable attenuator's internal structure includes a series of relays which add or remove lossy elements in combination (10 dB, 20 dB, 40 dB, etc.) to achieve the desired total attenuation. The relay drivers which select these increments are located on the leveling circuit board (A5). Verify that the attenuator is receiving the appropriate drive signals; if not, investigate the drivers on the leveling board and the computer logic lines which control them.

NOTE 4 -- MODULATOR

The RF path through the microwave module is divided into two or more (depending on output bandwidth) filter lines; pulse modulation is normally accomplished by turning the active path "off" at intervals. If the filter select/modulator control line for the active path is held at the "off" logic level, the RF signal will be shut down.

CORRECTIVE ACTION

The filter select/modulator control lines applied to the RF module have voltage levels of roughly +1 volt (for "off") and -1 volt (for "on"). The signals originate on the modulation control board (A118). If inappropriate signals are received, investigate the driver circuits on that board and the computer logic lines which control them.

NOTE 5 -- YIG OSCILLATOR

In addition to its power supply requirements, the YIG oscillator must have current supplied to its tuning coil within an appropriate range in order to generate an RF output of any kind. If tuning coil current is excessive or insufficient, there will be no signal.

CORRECTIVE ACTION

The easiest way to measure coil current is to read the voltage drop across the sense resistor. This is a large, high-wattage, metal-encased resistor (usually 5 or 7 ohms) mounted near the oscillator. One end is grounded, and the other is connected (through an NPN transistor controlled by the YIG driver board, A13) to the negative end of the YIG oscillator tuning coil. The voltage across the sense resistor, divided by the resistance, equals the coil current. Since the tuning sensitivity of the YIG oscillator is 20 MHz/mA, the current (in Amps) for a given frequency can be calculated by dividing the frequency (in GHz) by 20. Current values corresponding to frequencies outside the range of the oscillator will shut the oscillator down.

If the coil current is out of range, investigate the NPN transistor and the YIG oscillator circuit (A13) which drives its base.

NOTE 6 -- LEVELER

The signal path through the RF module includes a voltage controlled attenuator circuit, or "leveler". The level control circuit board (A5) has an output which uses complementary transistors to drive the leveler pin on the outside of the module. The leveler increases attenuation as the input becomes more positive, and reduces attenuation as the input becomes more negative; sensitivity to the control voltage varies for individual instruments. The voltage swing, as measured at the module's leveler pin, is (very roughly) from -2 volts to +12 volts.

CORRECTIVE ACTION

When the output level is incorrect, the leveler input voltage may be clearly inappropriate in a way which indicates the cause of the problem. If output power is too low, and the leveler at the positive rail (maximum attenuation), the level control circuit is reducing the output power by sending a bad control signal; if output power is too low and the leveler at the negative rail (minimum attenuation), the level control circuit is trying unsuccessfully to compensate for power loss occurring somewhere in the RF path (the loss could be in the RF module itself).

If power is too high, and the leveler at the positive rail (maximum attenuation), the leveler circuit within the module is faulty; if power is too high and the leveler at the negative rail (minimum attentuation), the level control circuit is increasing the output power by sending a bad control signal.

If the level control voltage is between the extremes of its range, but the output level is still incorrect, the fault is probably in the level control circuit.

A failure of the leveler or other circuits in the RF module is unlikely, but can be caused by excessive reverse power applied at the instrument's RF output connnector.

NOTE 7 -- DETECTOR

The instrument's leveling system requires feedback from the RF path in order to control output power. This is provided by a negative-output diode detector, driven by a signal coupled from the RF output. The internal detector is mounted directly on the level coupler output of the RF module. An external detector can also be used, by attaching the cable from the external detector to the external ALC input on the rear panel.

CORRECTIVE ACTION

A failure of the internal detector itself is unlikely, but it is important to verify that the detector signal is in fact being received by the level control board (A5). When there is an apparent failure of the leveling system, disconnecting the detector cable and observing the resulting changes is often a revealing experiment.

Be sure that the correct levelling mode is activated (external ALC should not be enabled unless an external detector is in use).

NOTE 8 -- LEVEL CONTROL CIRCUIT

The level control circuit board (A5) is basically a loop amplifier which must balance a variable input (feedback from the level detector) against a reference signal. The detector can be either the internal detector mounted outside the RF module, or a remote detector (in the external ALC mode). The reference signal is derived from a combination of three inputs: the leveling reference programmed by the system computer, the correction signal from the temperature compensation circuit board (A111), and the AM signal, if any, from the modulation control board (A118). The level control circuit, using its output to drive the leveler in the RF module, adjusts output power in whichever direction will equalize the reference and variable inputs to the loop amplifier. So long as the output is between the extremes of its control range, the output is considered to be "leveled" and the indicator on the front panel will remain lit.

CORRECTIVE ACTION

If the 'LEVEL' indicator on the front panel is dark, the leveler output should be at one extreme or the other of its control range, and comparing the control signal with the result will indicate the nature of the problem (see note 6 above). If the indicator is lit, the control signal should be within its control range, and if the output power is nevertheless incorrect, it is likely that the level control circuit is receiving a bad input, is defective, or has been incorrectly calibrated.

If possible, replace the level control circuit with a known good board. Make sure that the potentiometers on the board have not been improperly adjusted (see the calibration procedure in Section 4). Check all inputs and control signals to the board, including the input from the temperature compensation board, the data lines to the digital/analog converter, the AM input, the AM control line, and the detector input. Be sure that the instrument has not been set to the wrong leveling mode (if an external detector is not being used, external ALC should be off).

An excellent way to investigate a problem in the leveling system is to break the loop, by disconnecting the detector or the leveler control line, and observe the resulting changes.

NOTE 9 -- INDIVIDUAL PLL LOCK INDICATORS

Each of the six phase lock loop circuit boards has a lock indicator, in the form of an LED which is dark only for the "locked" condition.

CORRECTIVE ACTION

Determine which PLL or PLLs are unlocked. The relevant boards are:

A6 (output PLL)
A8 (40-80 MHz PLL)
A9 (intermediate PLL)
A10 (10-12 MHz PLL)
A11 (300-350 MHz PLL)
A12 (110 MHz PLL)
A119 (downconverter PLL; installed only in units that include the <2 GHz range)

If two or more loops are unlocked, it is possible that one unlocked loop is disabling "subsequent" loops which use the output of the first as a reference. The hierarchy of the loops, in terms of this dependency, may be divided into two branches terminating in the reference and variable inputs to the output PLL:

REFERENCE BRANCH	VARIABLE BRANCH
A12 (110 MHz PLL)	A12 (110 MHz PLL)
A10 (10-12 MHz PLL)	A11 (300-350 PLL)
A9 (intermediate PLL)	A6 (output PLL)
A8 (40-80 MHz PLL)	
A6 (output PLL)	

NOTE: the downconverter PLL (A119) is subsequent to the output PLL in those instruments in which it is installed (units that include the <2 GHz range only).

NOTE 10 -- OUTPUT PHASE LOCK LOOP

This circuit is located on the A6 PC board.

CORRECTIVE ACTION

Verify appropriate inputs (from the divide-by-N circuit, and the divide-by-8 circuit) and control line status (FM on/off).

The output to the FM driver (A103) goes more negative to increase the YIG output frequency, more positive to decrease frequency -- be sure that the PLL output is not driving the YIG oscillator in the wrong direction.

Verify that the output signal is reaching the FM driver, and that the driver's output is reaching the YIG oscillator FM coil and is being fed back to the output amplifier of the PLL.

If possible, replace the circuit with a known good board.

NOTE 11 -- DIVIDE-BY-N

This circuit is one half of the frequency divider PC board (A7).

CORRECTIVE ACTION

Verify that the appropriate IF is being received from the 300-350 MHz oscillator circuit board (A104).

Verify that the circuit is being programmed with the correct divisor.

Verify that the IF is being correctly divided and that the output signal is reaching the output PLL (A6).

If possible, replace the circuit with a known good board.

NOTE 12 -- 300-350 MHz OSCILLATOR/DRIVER

This circuit board (A104) is encased in an aluminum housing mounted on the microwave deck, directly beneath the RF module.

CORRECTIVE ACTION

This circuit is mounted in an inaccessible location; the most that can normally be done to investigate it in the field is to verify that the input from the RF module coupler, the control input from the 300-350 MHz PLL (A11), and the IF output to the divide-by-N (A7) are all present.

NOTE 13 -- 300-350 MHz PLL

This circuit is located on the A11 PC board.

CORRECTIVE ACTION

Verify appropriate inputs (from the 110 MHz oscillator/multiplier, 10 MHz master reference, and VCO feedback from the 300-350 oscillator) and control signals (from the computer).

Verify that the control output for tuning the VCO is present and is reaching the 300-350 oscillator.

If possible, replace the circuit with a known good board.

NOTE 14 -- YIG DRIVER

This circuit is located on the A13 PC board.

CORRECTIVE ACTION

If this circuit is tuning the YIG oscillator to the wrong frequency, the error may be too large for the output PLL to correct. The problem sometimes occurs after incorrect adjustment of the "MIN" and "MAX" pots, in which case the output loop may be able to lock at some frequencies but not others. If the instrument develops phase lock problems after calibration of the YIG driver, try repeating the adjustment. Be sure to follow the correct calibration procedure as outlined in Section 4.

If the driver calibration is not to blame for the unlocked condition, attempts to adjust it may only aggravate the problem. Therefore, it is a good idea to determine first whether the driver output is approximately correct for the requested output frequency.

As described in note 5 above, the oscillator tuning coil has a sensitivity of 20 MHz/mA. The NPN transistor which controls the coil current is driven at its base by a control voltage from the YIG driver. Because of large variations in coil impedence it is not possible to specify a "correct" voltage. However, it should be a positive voltage increasing with frequency at a rate of roughly 650 mV/GHz. A more exact idea of the coil current can be obtained from the voltage drop accross the sense resistor (see note 5).

If the driver output seems substantially wrong, the cause could be bad control data to the digital/analog converter as well as bad calibration.

If possible, replace the circuit with a known good board.

NOTE 15 -- 110 MHz OSCILLATOR/MULTIPLIER

This circuit board (A113) is encased in an aluminum housing mounted on the underside of the microwave chassis.

CORRECTIVE ACTION

This circuit is mounted in an inaccessible location; the most that can normally be done to investigate it in the field is to verify that the tuning input is being received from the 110 MHz PLL (A12) and that the doubler and tripler outputs (220 and 330 MHz) are present and are reaching their destinations.

NOTE 16 -- 110 MHz PLL

This circuit is located on the A12 PC board.

CORRECTIVE ACTION

Verify that the 10 MHz master reference input is being received.

Verify that the 110 MHz input is being received.

If possible, replace the circuit with a known good board.

NOTE 17 -- 10 MHz MASTER REFERENCE

The internal timebase is located between the front panel and the power supply; the 10 MHz input/output circuit is located on the 110 MHz PLL circuit board (A12).

CORRECTIVE ACTION

Verify that the signals from the internal timebase, and from the external timebase (if any), are being received by the 10 MHz input/output circuit.

Verify that the 10 MHz signal from the input/output circuit is reaching the various PLL circuits which require it.

NOTE 18 -- DIVIDE-BY-8

This circuit is one-half of the frequency divider PC board (A7).

CORRECTIVE ACTION

Verify that the input is being received from the 40-80 MHz PLL (A8).

Verify that the input is being divided by 8 and that the output signal is reaching the output PLL (A6).

If possible, replace the circuit with a known good board.

NOTE 19 -- 40-80 MHz PLL

This circuit is located on the A8 PC board.

CORRECTIVE ACTION

Verify that the 10 MHz input is being received from the master reference.

Verify that the 225-226 MHz input is being received from the intermediate PLL (A9).

Verify that the 40-80 MHz output is reaching the divide-by-8 circuit (A7).

If possible, replace the circuit with a known good board.

NOTE 20 -- INTERMEDIATE PLL

This circuit is located on the A9 PC board.

CORRECTIVE ACTION

Verify that the 220 MHz input is being received from the 110 MHz oscillator/multiplier (A113).

Verify that the 10-12 MHz input is being received from the 10-12 MHz PLL (A10).

Verify that the 225-226 MHz output is reaching the 40-80 MHz PLL (A8).

If possible, replace the circuit with a known good board.

NOTE 21 -- 10-12 MHz PLL

This circuit is located on the A10 PC board.

CORRECTIVE ACTION

Verify that the 220 MHz input is being received from the 110 MHz oscillator/multiplier (A113).

Verify that the 10 MHz input is being received from the master reference.

Verify that the 10-12 MHz output is reaching the intermediate PLL.

If possible, replace the circuit with a known good board.

NOTE 22 -- FM DRIVER

This circuit is located on the RF bus board, A103.

CORRECTIVE ACTION

Verify that the FM input signal is being received from the output PLL circuit (A6).

Verify that the output signal is reaching the YIG oscillator FM coil's negative terminal and is also being fed back to the output PLL. This output goes more negative to increase frequency, more positive to decrease.

NOTE 23 -- OUTPUT PHASE LOCK LOOP (FM)

This circuit is located on the A6 PC board.

CORRECTIVE ACTION

Verify that the FM input signal is being received from the modulation control board (A118).

Verify that the FM control line is activating the FM mode.

Verify that the FM output signal is reaching the FM driver (A103) and that the driver output is being fed back to this circuit.

If possible, replace the circuit with a known good board.

NOTE 24 -- MODULATION CONTROL (FM)

This circuit is located on the A118 PC board.

CORRECTIVE ACTION

Verify that all control inputs are appropriate to the FM mode selected (e.g., remote or local control, internal or external FM, etc.), and that an external modulation input (if applicable) is being received.

Verify that the FM output signal is reaching the output PLL (A6).

NOTE 25 -- LEVELER (AM)

The RF module's variable attenuator, described in note 6 above, is used for amplitude modulation as well as for RF leveling.

CORRECTIVE ACTION

Verify that the control signal is being received from the level control circuit (A5). The control pin should go more positive to increase attenuation, more negative to reduce attenuation.

NOTE 26 -- LEVEL CONTROL CIRCUIT (AM)

This circuit is located on the A5 PC board.

CORRECTIVE ACTION

Verify that the AM input signal is being received from the modulation control circuit (A118) and that the AM mode is being selected by the control input.

Verify that the AM signal is present on the output to the leveler.

If possible, replace the circuit with a known good board.

NOTE 27 -- MODULATION CONTROL (AM)

This circuit is located on the A118 PC board.

CORRECTIVE ACTION

Verify that all control inputs are appropriate to the AM mode selected (e.g., remote or local control, internal or external AM, etc.), and that an external modulation input (if applicable) is being received.

Verify that the AM output signal is reaching the level control board (A5).

NOTE 28 -- MODULATOR

The RF module's filter select/modulation lines, described in note 4 above, are used for pulse modulation.

CORRECTIVE ACTION

Verify that the filter select/modulation control pin which is active for the requested output frequency has positive pulses corresponding with the "off" periods of the instrument's RF output; these should be received from the modulation control circuit (A118).

NOTE 29 -- MODULATION CONTROL (PULSE MODULATION)

This circuit is located on the A118 PC board.

CORRECTIVE ACTION

Verify that all control inputs are appropriate to the pulse mode selected (e.g., internal or external, remote or local control) and that an external modulation input (if applicable) is being received.

Verify that the modulation output is reaching the appropriate pulse modulator pin on the RF module.

NOTE 30 -- GPIB ADDRESS

The DIP switches which set the address are located on the A111 PC board, which is mounted at the rear panel.

CORRECTIVE ACTION

Verify that the address assigned to the instrument by the GPIB bus controller is properly set (in the form of a 5-place binary number) by the five switches located on the rear panel. If the address is set incorrectly, the instrument will ignore all IEEE-488 commands.

NOTE 31 -- COMMANDS

Section 1 includes a full description of the syntax and commands appropriate to the operation of Model 605 under remote control using the IEEE-488 interface bus. Be sure than any remote commands issued to the instrument conform to the guidelines set forth in that description.

NOTE 32 -- IEEE-488 INTERFACE CIRCUIT

This circuit is found on the A3 PC board.

CORRECTIVE ACTION

Verify that this circuit's data and control lines have continuity to the rear panel connector and to the CPU. If possible, replace the circuit with a known good board.

NOTE 33 -- DOWNCONVERTER SWITCH

This circuit is housed in an RF module located near the 10 dB step attenuator; it is installed only in instruments which include the .01-2 GHz range.

CORRECTIVE ACTION

If the downconverter switch is set to the wrong position, the RF output path will be blocked. Verify that the control lines from the downconverter PLL board (A119) are within .5V of the following values: A119 pin 8, -10.5V for <2 GHz, +14.5V for >2 GHz; A119 pin 9, +0.9V for <2 GHz, -7.8V for >2 GHz.

NOTE 34 -- DOWNCONVERTER PLL

This circuit is located on the A119 PC board. It is installed only in instruments which include the .01-2 GHz range.

CORRECTIVE ACTION

First, investigate the coarse tuning output to the downconverter's fixed local oscillator, as follows: set the instrument to 1.000 GHz, ground TP1 on the A119 board, and verify that the instrument's output frequency is accurate within 15 MHz. If not, readjust A119 R29 for exactly 1.000 GHz. Verify that the coarse tuning output (A119 pin 13) is reaching the downconverter module.

Verify that the A119 board is receiving the 10 MHz reference input (A119 J2) and the 10 MHz IF input from the downconverter module (A119 J1). Verify that the fine tuning output (A119 J3) is reaching the downconverter module.

PARTS LIST

Parts List for 308DA00500 M605/2-8 SHIPPING ASY Rev A

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	308DA00600	1	58900		M605 TEST ASY
2	304AA10200	1	58900		M600 ROM SET U
3	101BA09702	1	58900		TCXO PCA
4	308DF00100	1	58900		DEC PNL RF M605
5	304DA08702	1	58900		M605 BENCHTOP CAB. ASY
6	304CA08600	1	58900		FREQ 2-8 ASY
7	003BA02300	1	58900		RF CONN N-TYPE F PNL ASY
8	003BA02200	1	58900		FRONT PANEL RF M6XX ASY

Parts List for 304CA08600 FREQ 2-8 ASY Rev D

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
3	004BA13001	1	58900		2-8 MODULE, 600 (M180)
4	MPBO-01303	1	28480	33322G-90	0-110DB 13GHZ PGM ATTEN
5	MOYT-10208	1	24539	YO85-2217	2-8GHZ YIG XSTR OSC
6	JRAA-00200	1	98291	50-673-0159-31	SMA M TO SMA M ADAPT
7	RN55-00150	1	05905	SMA 0207 E 96	15 OHMS 1% MET FILM
8	RC20-00220	1	01121	EB-220-5	22 OHMS 5% 1/2W CARBON
9	DPAB-05391	1	04713	1N5391	IN5391 1.5A 35V DIODE
10	MDSO-00034	1	H0002	D2262-44	.01-34GHZ DETECTOR
11	304CA09801	1	58900		.085 CABLE #600A ASY
12	304CA09815	1	58900		.085 CABLE #600AA ASY
13	304CA09816	1	58900		.085 CABLE #600BB ASY
14	RW25-00070	1	15915	TM25-7 OHM-1%Y	7 OHM 25W KELVIN LEAD
15	304AW08600	1	58900		M600 FREQ. 2-8 W/L
16	004BA28200	1	58900		5.2 FILTER ASY

Parts List for 308DA00501 M605/6-12 SHIPPING ASY Rev A

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	308DA00600	1	58900		M605 TEST ASY
2	304AA10200	1	58900		M600 ROM SET U
3	101BA09702	1	58900		TCXO PCA
4	308DF00100	1	58900		DEC PNL RF M605
5	304DA08702	1	58900		M605 BENCHTOP CAB. ASY
6	304CA08603	1	58900		FREQ 6-12 ASY
7	003BA02300	1	58900		RF CONN N-TYPE F PNL ASY
8	003BA02200	1	58900		FRONT PANEL RF M6XX ASY

Parts List for 304CA08603 FREQ 6-12 ASY Rev D

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	301CF00400	1	58900		OSCILLATOR BRACKET
2	004BA14100	1	58900		5-12 MODULE ASY
3	MPB0-01803	1	28480	33322H-90	0-110DB 18GHZ PGM ATTEN
4	M0YT-00513	1	24539	Y085-1266	5.4-12.5 GHz YIG OSC
5	RC20-00220	1	01121	EB-220-5	22 OHMS 5% 1/2W CARBON
6	RN55-00150	1	05905	SMA 0207 E 96	15 OHMS 1% MET FILM
7	DPAB-05391	1	04713	1N5391	IN5391 1.5A 35V DIODE
8	JRAA-00200	1	98291	50-673-0159-31	SMA M TO SMA M ADAPT
9	304CA09909	1	58900		.141 CABLE #600T ASY
10	MDS0-00034	1	H0002	D2262-44	.01-34GHZ DETECTOR
11	RW25-00050	1	15915	TM25-5 OHM-1%Y	5 OHM 25W KELVIN LEAD
12	304AW08601	1	58900		M600 FREQ. 6-12 W/L
13	304CA09901	1	58900		.141 CABLE #600D ASY
14	304BF14100	1	58900		ATTENUATOR SHIM

Parts List for 308DA00502 M605/10-18 SHIPPING ASY Rev A

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	308DA00600	1	58900		M605 TEST ASY
2	304AA10200	1	58900		M600 ROM SET U
3	101BA09702	1	58900		TCXO PCA
4	308DF00100	1	58900		DEC PNL RF M605
5	304DA08702	1	58900		M605 BENCHTOP CAB. ASY
6	304CA08602	1	58900		FREQ 10-18 ASY
7	003BA02300	1	58900		RF CONN N-TYPE F PNL ASY
8	003BA02200	1	58900		FRONT PANEL RF M6XX ASY

Parts List for 304CA08602 FREQ 10-18 ASY Rev D

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	301CF00400	1	58900		OSCILLATOR BRACKET
2	304CA09911	1	58900		.141 CABLE #600W ASY
3	004BA15000	1	58900		10-18 MODULE, 600(M182)
4	MPBO-01803	1	28480	33322H-90	0-110DB 18GHZ PGM ATTEN
5	MOYT-01018	1	24539	YO85-2639	10-18 YIG OSC;100 MW
6	RC20-00220	1	01121	EB-220-5	22 OHMS 5% 1/2W CARBON
7	RN55-00150	1	05905	SMA 0207 E 96	15 OHMS 1% MET FILM
8	DPAB-05391	1	04713	1N5391	IN5391 1.5A 35V DIODE
10	JRAA-00200	1	98291	50-673-0159-31	SMA M TO SMA M ADAPT
12	304CA09902	1	58900		.141 CABLE #600E ASY
13	MDSO-00034	1	H0002	D2262-44	.01-34GHZ DETECTOR
15	RW25-00050	1	15915	TM25-5 OHM-1%Y	5 OHM 25W KELVIN LEAD
16	304AW08602	1	58900		M600 FREQ. 10-18 W/L
17	MIMM-01018	1	DITOM		ISO SNGL JNC 10-18,16dB

Parts List for 308DA00506 M605/6-18 SHIPPING ASY Rev A

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	308DA00600	1	58900		M605 TEST ASY
2	304AA10200	1	58900		M600 ROM SET U
3	101BA09702	1	58900		TCXO PCA
4	308DF00100	1	58900		DEC PNL RF M605
5	304DA08702	1	58900		M605 BENCHTOP CAB. ASY
6	304CA08605	1	58900		FREQ 6-18 ASY
7	003BA02300	1	58900		RF CONN N-TYPE F PNL ASY
8	003BA02200	1	58900		FRONT PANEL RF M6XX ASY

Parts List for 304CA08605 FREQ 6-18 ASY Rev A

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	301CF00400	1	58900		OSCILLATOR BRACKET
2	304CA09901	1	58900		.141 CABLE #600D ASY
3	004BA15000	1	58900		10-18 MODULE, 600(M182)
4	MPB0-01803	1	28480	33322H-90	0-110DB 18GHZ PGM ATTEN
5	MOYT-00618	1	24539	AV-76018	6-18GHZ, YIG XSTR OSC
6	RC20-00220	1	01121	EB-220-5	22 OHMS 5% 1/2W CARBON
7	RN55-00150	1	05905	SMA 0207 E 96	15 OHMS 1% MET FILM
8	DPAB-05391	1	04713	1N5391	IN5391 1.5A 35V DIODE
10	JRAA-00200	1	98291	50-673-0159-31	SMA M TO SMA M ADAPT
12	304CA09902	1	58900		.141 CABLE #600E ASY
13	MDS0-00034	1	H0002	D2262-44	.01-34GHZ DETECTOR
15	RW25-00050	1	15915	TM25-5 OHM-1%Y	5 OHM 25W KELVIN LEAD
16	304AW08602	1	58900		M600 FREQ. 10-18 W/L

Parts List for 308DA00503 M605 /.01-8 SHIPPING ASY Rev A

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	308DA00600	1	58900		M605 TEST ASY
2	304AA10200	1	58900		M600 ROM SET U
3	308DF00100	1	58900		DEC PNL RF M605
4	304DA08702	1	58900		M605 BENCHTOP CAB. ASY
5	304CA08604	1	58900		FREQ .01-8 ASY
6	304CA11900	1	58900		M600 DWNCONV CHASSIS ASY
7	101BA09702	1	58900		TCXO PCA
8	003BA02300	1	58900		RF CONN N-TYPE F PNL ASY
9	003BA02200	1	58900		FRONT PANEL RF M6XX ASY

Parts List for 304CA08604 FREQ .01-8 ASY Rev C

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	004BA13001	1	58900		2-8 MODULE, 600 (M180)
2	MOYT-20208	1	24539	Y087-4198	2-8GHZ YIG XSTR OSC
3	MPBO-01303	1	28480	33322G-90	0-110DB 13GHZ PGM ATTEN
4	MDSO-00034	1	H0002	D2262-44	.01-34GHZ DETECTOR
5	304CA09815	1	58900		.085 CABLE #600AA ASY
6	304CA09816	1	58900		.085 CABLE #600BB ASY
7	304CA09817	1	58900		.085 CABLE #600GG ASY
8	304CA09801	1	58900		.085 CABLE #600A ASY
9	JRAA-00200	1	98291	50-673-0159-31	SMA M TO SMA M ADAPT
10	RN55-00150	1	05905	SMA 0207 E 96	15 OHMS 1% MET FILM
11	RC20-00220	1	01121	EB-220-5	22 OHMS 5% 1/2W CARBON
12	DPAB-05391	1	04713	1N5391	IN5391 1.5A 35V DIODE
14	RW25-00070	1	15915	TM25-7 OHM-1%Y	7 OHM 25W KELVIN LEAD
15	304AW08600	1	58900		M600 FREQ. 2-8 W/L
16	004BA28200	1	58900		5.2 FILTER ASY
Z 1	HBPP-63205	4	96906	MIL STD	6-32 X 5/16 PAN
Z 2	HBPP-44005	2	96906	MIL STD	4-40 X 5/16 PAN
Z 3	HBPP-44006	2	96906	MIL STD	4-40 X 3/8 PAN
Z 4	HWFS-40500	2	96906	MS15795-804	#4 X 5/16 FLAT WASHER
Z 5	HWSS-40300	4	96906	MS35337-135	#4 X 3/16 SPLIT LOCK
ZZ 1	HBPP-44005	2	96906	MIL STD	4-40 X 5/16 PAN
ZZ 2	HWFS-60600	4	96906	MS15795-806	#6 X 3/8 FLAT WASHER
ZZ 3	HWFS-40400	2	96906	MS15795-803	#4 X 1/4 FLAT WASHER
ZZ 4	HWSS-40300	2	96906	MS35337-135	#4 X 3/16 SPLIT LOCK
ZZ 5	HWSS-60400	4	96906	MS35337-136	#6 X 1/4 SPLIT LOCK

Parts List for 308DA00600 M605 TEST ASY Rev A

	Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	304DA01600	1	58900		M600 COMPUTER CHASSIS AS
	2	304CA04300	4	58900		PC SHIELD CKT SIDE ASY
	3	304CA04301	2	58900		PC SHIELD COMP. SIDE
	4	304CA08400	1	58900		CPU PC SHIELD ASY
	5	304CA01800	1	58900		M600 REAR PANEL ASY
	6	308DA00800	1	58900		M605 FRONT PANEL ASY
	7	304DA02000	1	58900		MICROWAVE DECK ASY
	8	304CA01700	1	58900		M600 HEATSINK ASY
	9	301DF01500	2	58900		SIDE GUSSET
	11	304BC03600	1	58900		POWER RIBBON CABLE
	12	304BC03700	1	58900		UWAVE/PULSE RIBBON CABLE
	13	304BC03800	1	58900		MOD/PWR DISP RIBBON CABL
	14	304BC03900	1	58900		FREQ DISP RIBBON CABLE
	15	304BC04000	1	58900		TWS RIBBON CABLE
A	1	101CA29500	1	58900		DISPLAY PIA PCA
A	2	101CA35700	1	58900		MEMORY (64K) PCA
A	3	101CA06700	1	58900		IEEE PIA PCA
A	4	101CA35800	1	58900		CPU (64K) PCA
A	5	304CA03500	1	58900		LEVEL CONTROL PCA
A	6	304CA01001	1	58900		OUTPUT PLL PCA
A	7	304CA03100	1	58900		DIVIDER PCA
A	8	304CA03000	1	58900		40-80 MHZ PLL PCA
A	11	304CA02200	1	58900		300 MHz PLL PCA
A	12	304CA05600	1	58900		110 MHz REF PLL PCA
A	13	304CA02401	1	58900		YIG DRIVER PCA

Parts List for 304DA01600 M600 COMPUTER CHASSIS AS Rev D

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	304BA01100	1	58900		POWER SUPPLY PCA
2	304CC00201	1	58900		M600/M610 PWR TRANSFORME
3	304DF00801	1	58900		COMPUTER CHASSIS
4	304CF00701	1	58900		CARD CAGE FRONT WALL
5	304BA03300	1	58900		COMPUTER BUS PCA
6	101CF03400	1	58900		CARD CAGE REAR WALL
7	CE35-08900	2	65517	EMC922AH35T	>9000 UF >35V ELECT.
8	CE15-09180	2	65517	EMC183AG15T	>18000 UF >15V ELECT.
9	DBMC-00980	2	04713	MDA980-2	MDA980-2 BRIDGE RECT.
10	HGP0-04125	10	07556	58-30-40	4.125" CARD GUIDE
11	HIGR-00437	1	06540	1155A	7/16" GROMMET
12	HIGP-00090	1	95987	WG201	FLEXIBLE GROMMET
13	HLLT-60212	5	79963	505-#6	#6 SOLDER LUG
14	HLST-A1211	11	79963	627-.196	#10 SOLDER LUG
15	JPS0-20006	1	MP001	3156-06-DP-1K	PC EDGE CONN, DUAL 6 PIN
16	304AW01600	1	58900		M60X CHASSIS W/L

Parts List for 304CA04300 PC SHIELD CKT SIDE ASY Rev A

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	304BF04300	1	58900		PC SHIELD CKT SIDE

Parts List for 304CA04301 PC SHIELD COMP. SIDE Rev A

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	304BF04301	1	58900		PC BD SHIELD FRONT
2	HSTS-406X4	4	55566		4-40 X .375L X .25D

Parts List for 308DA00800 M605 FRONT PANEL ASY Rev C

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	308DF00201	1	58900		FRONT SUB-PANEL M605/610
2	304DA02300	1	58900		MOD/PWR DISPLAY PCA
3	304CA02600	1	58900		FREQUENCY DISPLAY PCA
4	304BA02500	1	58900		5 POS LEVER SWITCH PCA
5	304CA02100	1	58900		8 POS LEVER SWITCH PCA
6	308DA00301	1	58900		MODULATION CONTROL PCA
7	JRDF-00001	3	02660	31-221	BNC F PANEL MOUNT
9	STPO-00202	1	09353	9201 J2 Z2Q	115VAC DPDT SWITCH
10	KBRC-37125	2	86797	GR-50-2	3/8"D ROUND BLACK KNOB
11	308AW00800	1	58900		M605 FRONT PANEL W/L

Parts List for 304DA02000 MICROWAVE DECK ASY Rev D

	Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	304DF00900	1	58900		MICROWAVE CHASSIS
	2	304CA05700	1	58900		OSCILLATOR/MULT PCA
	3	304CA05500	1	58900		300 MHz OSC PCA
	4	304DA02900	1	58900		RF BUS PCA
	5	304BA04600	1	58900		TEMP COMP PCA
	6	RW05-01000	1	54343	SP11-23 100@5%	100 OHM 5W CHASSIS MT
	8	QBNP-05881	1	04713	2N5881	2N5881 15A 60V 160W NPN
	9	JSS0-30003	1	06776	MD3452-G	TO3 SOCKET
	10	HQIS-00030	1	55285	7403-09FR-05	TO3 INSULATOR
	11	HQCP-00030	1	13103	8903VB	TO3 STYLE COVER
	12	HIGP-00750	1	83330	8978	3/4" GROMMET
	13	HSTH-62404	6	55566	2120-632-A	6-32 X 1 1/2 HEX SPACER
	14	HLLT-60212	1	79963	505-#6	#6 SOLDER LUG
	15	HTM0-00001	3	06383	TA1S8	ANCHOR MOUNT
	16	HTM0-00002	1	06383	TM2S8	TIE MOUNT .06
Z	1	HBPP-63204	3	96906	MIL STD	6-32 X 1/4 PAN
Z	2	HBPP-63205	3	96906	MIL STD	6-32 X 5/16 PAN
Z	3	HBPP-63204	6	96906	MIL STD	6-32 X 1/4 PAN
Z	4	HBPP-63208	2	96906	MIL STD	6-32 X 1/2 PAN
Z	5	HBFP-44007	1	96906	MIL STD	4-40 X 7/16 FLAT
Z	6	HWSS-60400	7	96906	MS35337-136	#6 X 1/4 SPLIT LOCK
Z	7	HWFS-60500	5	96906	MS15795-805	#6 X 5/16 FLAT WASHER
Z	8	HWFS-40400	1	96906	MS15795-803	#4 X 1/4 FLAT WASHER
Z	9	HWSS-40300	1	96906	MS35337-135	#4 X 3/16 SPLIT LOCK
Z	10	HNSS-44003	1	96906	MS35649-***	4-40 HEX NUT
Z	11	HBFP-44004	7	96906	MIL STD	4-40 X 1/4 FLAT
ZZ	1	HBPP-25608	2	96906	MIL STD	2-56 X 1/2 PAN
ZZ	2	HWSS-20200	2	96906	MS35337-77	#2 X 1/8 SPLIT LOCK
ZZ	3	HWFS-20400	2	96906	MS15795-802	#2 X 1/4 FLAT WASHER
ZZ	4	HNKS-63204	7	96906	MS35649-***	6-32 KEP NUT

Parts List for 304CA01700 M600 HEATSINK ASY Rev D

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	301BF01600	2	58900		POWER SUPPLY HEATSINK
2	301CF00800	1	58900		FAN SHROUD
3	301BF00700	2	58900		FAN SHROUD COVER
4	101BA41400	1	58900		FAN ASSEMBLY
5	JSSO-30003	4	06776	MD3452-G	TO3 SOCKET
6	HIGR-00750	1	06540	1131D	3/4" GROMMET
7	HQIS-00030	4	55285	7403-09FR-05	TO3 INSULATOR
8	CC50-05100	9	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
9	URKO-78180	2	04713	MC7818CK	MC7818CK 18V 1A TO3 REG
10	URKO-03452	1	27014	LM345K-5.2	LM345K-5.2 3A -5.2V REG
11	URKO-03230	1	04713	LM323K	LM323K 5V 3A TO3 REGULAT
12	URCO-07805	1	04713	MC7805CT	MC7805CT 1A 5V REG
13	URCO-07815	1	04713	MC7815CT	MC7815CT 1A 15V REG
14	CT20-06100	1	56289	150D106X9020B2	10 UF 20V TANTALUM
15	HIGR-00375	4	06540	2170	3/8" GROMMET
16	CT20-06100	1	56289	150D106X9020B2	10 UF 20V TANTALUM
17	HSCR-60404	1	06540	9224A140	#6 X 1/4 CLEAR SPACER

Parts List for 101BA41400 FAN ASSEMBLY Rev B

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	BD00-05024	1	23936	MD24B2	24VDC FAN
2	CT30-07100	1	31433	T140D107M030AS	100UF 30V 20% TANTALUM

Parts List for 304AA10200 M600 ROM SET U Rev H

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	UMNO-02764	3	66148	HN4827C64-G20	HN4827C64G20 8K X8 EPROM
2	304AT10200	1	58900		M600 SOFTWARE U

Parts List for 304DA08702 M605 BENCHTOP CAB. ASY Rev A

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	301CF00901	1	58900		BOTTOM SUB COVER
2	301CF00900	1	58900		TOP SUB COVER
3	301CF01000	2	58900		FRONT TRIM
4	301BF01100	2	58900		FRONT TRIM, SIDE
5	301DF01200	2	58900		SIDE TRIM
6	101BF21600	1	58900		PC BOARD PULLER
7	101BF01000	4	58900		HANDLE FLANGE
8	101BF01900	2	58900		FOOT SUPPORT
9	301DF01400	4	58900		CORNER FRAME
10	HH00-62456	2	88245	A1034-30	OVAL BLACK HANDLE
11	HHR0-31456	2	88245	A1013-30	ROUND BLACK HANDLE
12	WMP0-03006	1	16428	17506B	RT ANG IEC POWER CORD
13	HFBI-00012	1	21604	MP-40008-4	12" INSIDE MOUNT BAIL
14	HFFL-63202	2	21604	PP 40012-1	LEFT FRONT FOOT
15	HFFR-63202	2	21604	PP 40012-2	RIGHT FRONT FOOT
16	HNTU-63206	8	78553	MP40366	#6 TINNERMAN NUT
19	301CF01700	1	58900		TOP COVER
20	301CF01800	1	58900		BOTTOM COVER
21	101BA08000	1	58900		COMPUTER EXTENDER ASY
22	101BA08200	1	58900		FLOATING EXTENDER ASY
23	JLFL-01503	1	05245	85-1503	2A 120V LABEL
24	HSEH-61104	12	05791	SS6981M1250.688	6-32 X 11/16 M/F 1/8THD

Parts List for 101BA08000 COMPUTER EXTENDER ASY Rev A

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	101BF08000	1	58900		COMPUTER EXTENDER PCB
2	JPPO-20013	1	31781	345-026-524-201	26 PIN PC EDGE CONN
3	JPPO-20017	1	31781	345-034-524-201	34 PIN PC EDGE CONN
4	JPPO-20030	1	31781	345-060-524-202	60 PIN PC EDGE CONN

Parts List for 101BA08200 FLOATING EXTENDER ASY Rev A

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	101BF08200	1	58900		FLOATING EXTENDER PCB
2	JPSO-20022	1	81312	HCB22SO	44 PIN PC EDGE CONN

Parts List for 304CA09801 .085 CABLE #600A ASY Rev A

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	JRAM-08500	2	57793	301-1	SMA M FOR .085 SEMI
2	WCSO-08600	1	16733	810-107	.086D SEMIRIGID COAX

Parts List for .085 CABLE #600B ASY No. 304CA09802 Rev. A

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	JRAM-08500	2	57793	301-1	SMA M FOR .085 SEMI
2	WCSO-08600	1	16733	810-107	.086D SEMIRIGID COAX

Parts List for 304CA09803 .085 CABLE #600G ASY Rev A

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	JRAM-08500	2	57793	301-1	SMA M FOR .085 SEMI
2	WCSO-08600	1	16733	810-107	.086D SEMIRIGID COAX

Parts List for 304CA09804 .085 CABLE #600H ASY Rev A

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	JRAM-08500	2	57793	301-1	SMA M FOR .085 SEMI
2	WCSO-08600	1	16733	810-107	.086D SEMIRIGID COAX

Parts List for 304CA09805 .085 CABLE #600J ASY Rev B

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	JRAM-08500	2	57793	301-1	SMA M FOR .085 SEMI
2	WCSO-08600	1	16733	810-107	.086D SEMIRIGID COAX

Parts List for 304CA09806 .085 CABLE #600K ASY Rev B

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	JRAM-08500	2	57793	301-1	SMA M FOR .085 SEMI
2	WCSO-08600	1	16733	810-107	.086D SEMIRIGID COAX

Parts List for 304CA09807 .085 CABLE #600L ASY Rev A

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	JRAM-08500	2	57793	301-1	SMA M FOR .085 SEMI
2	WCSO-08600	1	16733	810-107	.086D SEMIRIGID COAX

Parts List for 304CA09808 .085 CABLE #600M ASY Rev A

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	JRAM-08500	2	57793	301-1	SMA M FOR .085 SEMI
2	WCSO-08600	1	16733	810-107	.086D SEMIRIGID COAX

Parts List for 304CA09901 .141 CABLE #600D ASY Rev A

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	JRAM-14100	2	57793	300	SMA M FOR .141 SEMI
2	WCSO-14100	1	16733	810-007	.141D SEMIRIGID COAX

Parts List for 304CA09902 .141 CABLE #600E ASY Rev A

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	JRAM-14100	2	57793	300	SMA M FOR .141 SEMI
2	WCSO-14100	1	16733	810-007	.141D SEMIRIGID COAX

Parts List for 304CA09903 .141 CABLE #600C ASY Rev A

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	JRAM-14100	2	57793	300	SMA M FOR .141 SEMI
2	WCSO-14100	1	16733	810-007	.141D SEMIRIGID COAX

Parts List for 304CA09909 .141 CABLE #600T ASY Rev A

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	JRAM-08500	2	57793	301-1	SMA M FOR .085 SEMI
2	WCSO-14100	1	16733	810-007	.141D SEMIRIGID COAX

Parts List for 304CA09911 .141 CABLE #600W ASY Rev A

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	JRAM-14100	2	57793	300	SMA M FOR .141 SEMI
2	WCSO-14100	1	16733	810-007	.141D SEMIRIGID COAX

Parts List for 003BA02300 RF CONN N-TYPE F PNL ASY Rev A

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	JRXA-00200	1	95077	1132-6001	N TO SMA ADAPTER

Parts List for 003BA02200 FRONT PANEL RF M6XX ASY Rev A

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	304CA09903	1	58900		.141 CABLE #600C ASY

Parts List for 304CA11900 M600 DWNCONV CHASSIS ASY Rev B

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	004DA25000	1	58900		M600 DOWNCONVERTER ASY
2	304CA11600	1	58900		M600 DWNCONV. PLL PCA
3	004BA24000	1	58900		DOWNCONVERTER SW (M600)
4	304BA12100	1	58900		BUFFER MODULE PCA
5	304CA09803	1	58900		.085 CABLE #600G ASY
6	304CA09804	1	58900		.085 CABLE #600H ASY
7	304CA09805	1	58900		.085 CABLE #600J ASY
8	304CA09806	1	58900		.085 CABLE #600K ASY
9	304CA09807	1	58900		.085 CABLE #600L ASY
10	HIGP-00090	2	95987	WG201	FLEXIBLE GROMMET
11	304CA09808	1	58900		.085 CABLE #600M ASY
12	MPFS-01806	1	64671	18A-6	6DB SMA M/F PAD
13	304CF12500	1	58900		DOWN CONV. MOUNT
14	309BF01700	1	58900		D/C SWITCH MOUNT
15	HBPP-44018	4	96906	MIL STD	4-40 X 1 1/8 PAN
16	304AW11900	1	58900		M600 DWNCONV CHASSIS W/L
ZZ 1	HBPP-44018	4	96906	MIL STD	4-40 X 1 1/8 PAN
ZZ 2	HBPP-44005	4	96906	MIL STD	4-40 X 5/16 PAN
ZZ 3	HBPP-63204	4	96906	MIL STD	6-32 X 1/4 PAN
ZZ 4	HBFP-44004	2	96906	MIL STD	4-40 X 1/4 FLAT
ZZ 5	HWSS-60400	4	96906	MS35337-136	#6 X 1/4 SPLIT LOCK
ZZ 6	HWSS-40300	8	96906	MS35337-135	#4 X 3/16 SPLIT LOCK
ZZ 7	HWFS-40400	4	96906	MS15795-803	#4 X 1/4 FLAT WASHER

Parts List for 304BA12100 BUFFER MODULE PCA Rev C

	Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	304BF12100	1	58900		BUFFER MODULE PCB
	2	304BF12600	1	58900		BUFFER MODULE MOUNT
	3	304CF09601	1	58900		BOTTOM PC BD SHIELD 1.5
	4	304CF09301	1	58900		TOP PC BD SHIELD 1.5 X 1
	5	304BF09400	1	58900		PC BD SHIELD COVER
	6	JRBM-00000	4	98291	51-045-0000	SMB M BULK MOUNT
	7	LFT0-83208	1	89110	859640-1	FEED-THRU FILTER 15A
AR	1	MA19-00001	1	24539	MSA-0135-12	0-250MHZ AMP 19DB 1.5DBM
AR	2	MA19-00001	1	24539	MSA-0135-12	0-250MHZ AMP 19DB 1.5DBM
C	1	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	2	CK50-03100	1	96733	SG133BX103KS	.01 UF X7R CHIP
C	3	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	4	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	5	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	6	CK50-03100	1	96733	SG133BX103KS	.01 UF X7R CHIP
R	1	RC05-06800	1	01121	BB-681-5	680ohm; 5% 1/8W CARBON
R	2	RC05-06800	1	01121	BB-681-5	680ohm; 5% 1/8W CARBON
U	1	URP0-78120	1	04713	MC78L12CP	MC78L12CP .1A 12V REG

Parts List for DISPLAY PIA ASSY No. 101CA29500 Rev. A

Item		Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	101CF29500	1	58900	101CF29500	DISPLAY PIA BD
C	1	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	2	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	3	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	4	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	5	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	6	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	7	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	8	CT10-06390	1	56289	150D396X9010B2	39 UF 10V TANTALUM
C	9	CT10-06390	1	56289	150D396X9010B2	39 UF 10V TANTALUM
IC	1	UCN0-00400	1	04713	MC14040BCP	MC14040BCP 12 BIT CTR
IC	2	UMN0-01824	1	02735	CDP1824CD	CDP1824CD 32X8 RAM
IC	3	UCN0-00280	1	04713	MC14028BCP	MC14028BCP BCD/DECIMAL
IC	4	UCN0-00290	1	04713	MC14029BCP	MC14029BCP 4 BIT CTR
IC	5	UMN0-01824	1	02735	CDP1824CD	CDP1824CD 32X8 RAM
IC	6	UCN0-00280	1	04713	MC14028BCP	MC14028BCP BCD/DECIMAL
IC	7	UGN0-06821	1	04713	MC6821P	MC6821P PIA
IC	8	UTN0-02451	1	01295	SN74LS245N	SN74LS245N 8X TRANSCEIVER
IC	9	UTN0-00170	1	01295	SN7417N	SN7417N HEX BUFFER
IC	10	UTN0-00321	1	01295	SN74LS32N	SN74LS32N QUAD OR
IC	11	UTN0-02441	1	01295	SN74LS244N	SNL4LS244N 8X DRIV/RECV
IC	12	101BC28409	1	58900	101BC28409	ADDRESS ROM A5-1
IC	13	UTN0-02441	1	01295	SN74LS244N	SNL4LS244N 8X DRIV/RECV
IC	14	UGN0-06821	1	04713	MC6821P	MC6821P PIA
IC	15	UGN0-06821	1	04713	MC6821P	MC6821P PIA
R	1	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R	2	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
R	3	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
TP	1	ETST-06224	1	88245	1280B	TURRET TERMINAL
X	1	JSP0-10018	1	09922	DILB18P-108	18 PIN DIP SOCKET
X	2	JSP0-10018	1	09922	DILB18P-108	18 PIN DIP SOCKET
X	3	JSP0-10020	1	09922	DILB20P-108	20 PIN DIP SOCKET
X	4	JSP0-10040	1	09922	DILB40P-108	40 PIN DIP SOCKET
X	5	JSP0-10040	1	09922	DILB40P-108	40 PIN DIP SOCKET
X	6	JSP0-10040	1	09922	DILB40P-108	40 PIN DIP SOCKET

Parts List for 101CA35700 MEMORY (64K) PCA Rev D

	Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	101CF35700	1	58900		MEMORY (64K) PCB
	3	ETST-06224	1	88245	1280B	TURRET TERMINAL
C	1	CT10-06390	1	56289	150D396X9010B2	39 UF 10V TANTALUM
C	2	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	3	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	4	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	5	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	6	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	7	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	8	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	9	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	10	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	11	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	12	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	13	CT10-06390	1	56289	150D396X9010B2	39 UF 10V TANTALUM
R	1	RC05-21000	1	01121	BB-103-5	10K; 5% 1/8W CARBON
U	6	UMN0-06264	1	61485	HM6264LP-15	HM6264LP-15 8K X 8 RAM
U	8	UTN0-00101	1	01295	SN74LS10N	SN74LS10 TRIPLE NAND
U	9	UTN0-02441	1	01295	SN74LS244N	SNL4LS244N 8X DRIV/RECV
U	10	UTN0-02441	1	01295	SN74LS244N	SNL4LS244N 8X DRIV/RECV
U	11	UTN0-02451	1	01295	SN74LS245N	SN74LS245N 8X TRANSCEIVE
U	12	UTN0-02401	1	01295	SN74LS240N	SN74LS240 8X DRIV/RECV
U	13	UTN0-00111	1	01295	SN74LS11N	74LS11 TRIPLE 3 IN AND
X	1	JSP0-10028	1	09922	DILB28P-108	28 PIN DIP SOCKET
X	2	JSP0-10028	1	09922	DILB28P-108	28 PIN DIP SOCKET
X	3	JSP0-10028	1	09922	DILB28P-108	28 PIN DIP SOCKET
X	4	JSP0-10028	1	09922	DILB28P-108	28 PIN DIP SOCKET
X	5	JSP0-10028	1	09922	DILB28P-108	28 PIN DIP SOCKET
X	6	JSP0-10028	1	09922	DILB28P-108	28 PIN DIP SOCKET
X	7	JSP0-10028	1	09922	DILB28P-108	28 PIN DIP SOCKET

Parts List for IEEE PIA PC ASSY No. 101CA06700 Rev. B

Item		Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	101CF06700	1	58900	101CF06700	IEEE PIA BD
C	1	CT10-06390	1	56289	150D396X9010B2	39 UF 10V TANTALUM
C	2	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	3	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	4	CT10-06390	1	56289	150D396X9010B2	39 UF 10V TANTALUM
C	5	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	6	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	7	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	8	CT10-06390	1	56289	150D396X9010B2	39 UF 10V TANTALUM
IC	1	UTN0-03651	1	01295	SN74LS365N	SN74LS365 HEX DRIVER
IC	2	UGN0-09914	1	01295	TMS9914NL	TMS9914NL IEEE-488
IC	3	UIN0-75162	1	01295	SN75162N	SN75162N IEEE BUFFER
IC	4	UIN0-75160	1	01295	SN7516ON	SN7516ON IEEE BUFFER
IC	5	UTN0-00170	1	01295	SN7417N	SN7417N HEX BUFFER
IC	6	UTN0-02451	1	01295	SN74LS245N	SN74LS245N 8X TRANSCEIVER
IC	7	UTN0-02441	1	01295	SN74LS244N	SNL4LS244N 8X DRIV/RECV
IC	8	101AC28401	1	58900	101AC28401	ADDRESS ROM A1
IC	9	UTN0-02441	1	01295	SN74LS244N	SNL4LS244N 8X DRIV/RECV
IC	10	UTN0-00321	1	01295	SN74LS32N	SN74LS32N QUAD OR
IC	11	UTN0-00001	1	01295	SN74LS00N	SN74LS00 QUAD NAND
IC	12	UTN0-01381	1	01295	SN74LS138N	SN74LS138N 3 TO 8 DEC
IC	13	UGN0-06821	1	04713	MC6821P	MC6821P PIA
R	1	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
R	2	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
R	3	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
R	4	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
R	5	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
R	6	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
R	7	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
R	8	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
R	9	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
R	10	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
R	11	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
R	12	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
R	13	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
R	14	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
R	15	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
R	16	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
R	17	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
R	18	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
TP	1	ETST-06224	1	88245	1280B	TURRET TERMINAL
X	1	JSP0-10040	1	09922	DILB40P-108	40 PIN DIP SOCKET
X	2	JSP0-10040	1	09922	DILB40P-108	40 PIN DIP SOCKET
X	3	JSP0-10020	1	09922	DILB20P-108	20 PIN DIP SOCKET

Parts List for CPU (64K) ASSY No. 101CA35800 Rev. B

Item		Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	101CF35800	1	58900	101CF35800	CPU (64K) BD
	2	ETST-06224	1	88245	1280B	TURRET TERMINAL
C	1	CC50-00270	1	52763	EDPT-27-NPO-5%	27 PF CERAMIC NPO
C	2	CC50-00270	1	52763	EDPT-27-NPO-5%	27 PF CERAMIC NPO
C	3	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	4	CT20-06022	1	56289	150D225X9020A2	2.2 UF 20V TANTALUM
C	5	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	6	CT10-06390	1	56289	150D396X9010B2	39 UF 10V TANTALUM
C	7	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	8	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	9	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	10	CT10-06390	1	56289	150D396X9010B2	39 UF 10V TANTALUM
C	11	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	12	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	13	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
Q	1	QBNS-02222	1	27014	PN2222	PN2222 .5A 30V NPN
R	11	RN55-21210	1	05905	SMA 0207 E 96	12.1 K OHMS 1% MET FILM
R	12	RN55-24750	1	05905	SMA 0207 E 96	47.5 K OHMS 1% MET FILM
R	13	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R	14	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R	15	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R	16	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R	17	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R	18	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R	19	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
R	20	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R	21	RN55-14990	1	05905	SMA 0207 E 96	4.99 K OHMS 1% MET FILM
S	1	SDP0-00801	1	71450	206-8	8 SPST DIP SWITCH
S	2	SPP0-00101	1	09353	TP11-H8AB	SPST PC MT PUSHBUTTON
U	1	UTN0-01230	1	01295	SN74123N	SN74123N DUAL ONE SHOT
U	2	UGN0-06809	1	04713	MC6809P	MC6809P MICROPROCESSOR
U	3	UTN0-02441	1	01295	SN74LS244N	SNL4LS244N 8X DRIV/RECV
U	4	UTN0-02441	1	01295	SN74LS244N	SNL4LS244N 8X DRIV/RECV
U	5	UTN0-02441	1	01295	SN74LS244N	SNL4LS244N 8X DRIV/RECV
U	6	UTN0-02451	1	01295	SN74LS245N	SN74LS245N 8X TRANSCEIVER
U	7	UTN0-02451	1	01295	SN74LS245N	SN74LS245N 8X TRANSCEIVER
U	9	UTN0-01381	1	01295	SN74LS138N	SN74LS138N 3 TO 8 DEC
U	10	UTN0-02401	1	01295	SN74LS240N	SN74LS240 8X DRIV/RECV
U	11	101AC28410	1	58900	101AC28410	ADDRESS ROM A2-1
U	12	UTN0-00170	1	01295	SN7417N	SN7417N HEX BUFFER
U	13	UTN0-00021	1	01295	SN74LS02N	SN74LS02 QUAD NOR
U	14	UGN0-06522	1	55576	SYP6522	SYP6522 VIA
X	1	JSP0-10028	1	09922	DILB28P-108	28 PIN DIP SOCKET
X	2	JSP0-10040	1	09922	DILB40P-108	40 PIN DIP SOCKET
X	3	JSP0-10020	1	09922	DILB20P-108	20 PIN DIP SOCKET
X	4	JSP0-10040	1	09922	DILB40P-108	40 PIN DIP SOCKET
Y	1	Y180-00358	1	63468	ED035	3.58MHZ FUND XTAL

Parts List for 304CA03500 LEVEL CONTROL PCA Rev L

	Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	304CF03500	1	58900		LEVEL CONTROL PCB
	2	ETST-06224	3	88245	1280B	TURRET TERMINAL
C	1	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	2	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	3	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	5	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	6	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	7	CC50-?????	1	51642	150-100-C0G-???J	SELECTED IN TEST
C	8	CT10-06390	1	56289	150D396X9010B2	39 UF 10V TANTALUM
C	9	CT10-06390	1	56289	150D396X9010B2	39 UF 10V TANTALUM
C	10	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	11	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	12	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	13	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	14	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	15	CT15-R6220	1	56289	196D226X9015KA1	22UF 15V 10% RADIAL LEAD
C	16	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	17	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	18	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	19	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	20	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	21	CC50-00047	1	51642	100-100-C0G-479J	4.7PF CERAMIC NPO
C	22	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	23	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	24	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	25	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	26	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	27	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	28	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	29	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	30	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	31	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	32	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	33	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	34	CC50-00330	1	52763	EDPT-33-NP0-5%	33 PF CERAMIC NPO
C	35	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	36	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	37	CC50-00220	1	52763	EDPT-22-NP0-5%	22 PF CERAMIC NPO
C	38	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	40	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	41	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	42	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	43	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	44	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	45	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	46	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	47	CC50-01220	1	51642	150-100-C0G-221	220 PF CERAMIC NPO
C	49	CC50-00027	1	51642	100-100-C0G-279C	2.7PF CERAMIC NPO
C	50	CC50-?????	1	51642	150-100-C0G-???J	SELECTED IN TEST
C	51	CT20-06100	1	56289	150D106X9020B2	10 UF 20V TANTALUM

Parts List for 304CA03500 LEVEL CONTROL PCA Rev L

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
C 52	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C 53	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C 54	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C 55	CC50-00150	1	52763	EDPT-15-NP0-5%	15 PF CERAMIC NP0
C 56	CC50-01220	1	51642	150-100-C0G-221	220 PF CERAMIC NP0
C 57	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C 58	CC50-01220	1	51642	150-100-C0G-221	220 PF CERAMIC NP0
C 59	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
CR 1	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR 2	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR 3	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR 4	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR 7	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
L 1	LAD0-05270	1	72259	WEE-2.7	2.7 UH INDUCTOR
Q 1	QBNS-04275	1	27014	PN4275	PN4275 .1A 15V .6W NPN
Q 3	QBPS-03645	1	27014	PN3645	PN3645 .5A 60V .6W PNP
Q 4	QBNS-03643	1	27014	PN3643	PN3643 .5A 30V .6W NPN
Q 5	QBNS-02222	1	27014	PN2222	PN2222 .5A 30V NPN
Q 6	QJNS-04091	1	04713	2N4091	2N4091 30OHM N CH JFET
Q 7	QJNS-04091	1	04713	2N4091	2N4091 30OHM N CH JFET
Q 8	QJNS-04091	1	04713	2N4091	2N4091 30OHM N CH JFET
Q 9	QJNS-04091	1	04713	2N4091	2N4091 30OHM N CH JFET
R 1	RN55-15620	1	05905	SMA 0207 E 96	5.62 K OHMS 1% MET FILM
R 2	RN55-15620	1	05905	SMA 0207 E 96	5.62 K OHMS 1% MET FILM
R 3	RN55-15620	1	05905	SMA 0207 E 96	5.62 K OHMS 1% MET FILM
R 4	RN55-15620	1	05905	SMA 0207 E 96	5.62 K OHMS 1% MET FILM
R 5	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 6	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 7	RN55-22000	1	05905	SMA 0207 E 96	20 K OHMS 1% MET FILM
R 8	RN55-17500	1	05905	SMA 0207 E 96	7.5 K OHMS 1% MET FILM
R 10	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 11	RN55-11210	1	05905	SMA 0207 E 96	1.21 K OHMS 1% MET FILM
R 12	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 13	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 14	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
R 15	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 16	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 17	RN55-31500	1	05905	SMA 0207 E 96	150 K OHMS 1% MET FILM
R 18	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 19	RN55-00511	1	05905	SMA 0207 E 96	51.1 OHMS 1% MET FILM
R 20	RN55-11500	1	05905	SMA 0207 E 96	1.5 K OHMS 1% MET FILM
R 21	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 22	RN55-13920	1	05905	SMA 0207 E 96	3.92 K OHMS 1% MET FILM
R 23	RAPD-11000	1	73138	89PR1K	1K POT 15T PC MNT
R 24	RN55-34750	1	05905	SMA 0207 E 96	475 K OHMS 1% MET FILM
R 25	RN55-33010	1	05905	SMA 0207 E 96	301 K OHMS 1% MET FILM
R 26	RAPD-21000	1	73138	89PR10K	10K POT 15T PC MNT
R 27	RN55-24990	1	05905	SMA 0207 E 96	49.9 K OHMS 1% MET FILM
R 28	RN55-26190	1	05905	SMA 0207 E 96	61.9 K OHMS 1% MET FILM
R 29	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
R 30	RN55-23740	1	05905	SMA 0207 E 96	37.4 K OHMS 1% MET FILM
R 31	RN55-22210	1	05905	SMA 0207 E 96	22.1 K OHMS 1% MET FILM
R 32	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 33	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
R 35	RN55-22800	1	05905	SMA 0207 E 96	28 K OHMS 1% MET FILM
R 37	RN55-16190	1	05905	SMA 0207 E 96	6.19 K OHMS 1% MET FILM
R 38	RN55-22000	1	05905	SMA 0207 E 96	20 K OHMS 1% MET FILM
R 38	RN55-22740	1	05905	SMA 0207 E 96	27.4 K OHMS 1% MET FILM
R 39	RN55-33010	1	05905	SMA 0207 E 96	301 K OHMS 1% MET FILM
R 40	RN55-26340	1	05905	SMA 0207 E 96	63.4 K OHMS 1% MET FILM
R 41	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 42	RN55-00511	1	05905	SMA 0207 E 96	51.1 OHMS 1% MET FILM
R 43	RAPD-21000	1	73138	89PR10K	10K POT 15T PC MNT
R 44	RN55-14990	1	05905	SMA 0207 E 96	4.99 K OHMS 1% MET FILM
R 45	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 46	RN55-28250	1	05905	SMA 0207 E 96	82.5 K OHMS 1% MET FILM
R 47	RN55-21690	1	05905	SMA 0207 E 96	16.9 K OHMS 1% MET FILM
R 48	RN55-41000	1	05905	SMA 0207 E 96	1 M OHMS 1% MET FILM
R 49	RAPD-11000	1	73138	89PR1K	1K POT 15T PC MNT
R 50	RN55-24320	1	05905	SMA 0207 E 96	43.2 K OHMS 1% MET FILM
R 51	RN55-11500	1	05905	SMA 0207 E 96	1.5 K OHMS 1% MET FILM
R 52	RAPD-22000	1	73138	89PR20K	20K POT 15T PC MNT
R 53	RN55-24220	1	05905	SMA 0207 E 96	42.2 K OHMS 1% MET FILM
R 54	RN55-14990	1	05905	SMA 0207 E 96	4.99 K OHMS 1% MET FILM
R 55	RN55-25360	1	05905	SMA 0207 E 96	53.6 K OHMS 1% MET FILM
R 56	RN55-23740	1	05905	SMA 0207 E 96	37.4 K OHMS 1% MET FILM
R 57	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 58	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 59	RN55-16190	1	05905	SMA 0207 E 96	6.19 K OHMS 1% MET FILM
R 60	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 61	RAPD-31000	1	73138	89PR100K	100K POT 15T PC MNT
R 62	RN55-24320	1	05905	SMA 0207 E 96	43.2 K OHMS 1% MET FILM
R 63	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 64	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 65	RN55-22000	1	05905	SMA 0207 E 96	20 K OHMS 1% MET FILM
R 66	RN55-22320	1	05905	SMA 0207 E 96	23.2 K OHMS 1% MET FILM
R 67	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 68	RN55-24990	1	05905	SMA 0207 E 96	49.9 K OHMS 1% MET FILM
R 69	RN55-28250	1	05905	SMA 0207 E 96	82.5 K OHMS 1% MET FILM
R 70	WJIB-05022	1	A0003	923345-05	.5" INSULATED JUMPER
R 71	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 72	RN55-24990	1	05905	SMA 0207 E 96	49.9 K OHMS 1% MET FILM
R 73	RN55-21500	1	05905	SMA 0207 E 96	15 K OHMS 1% MET FILM
R 74	RN55-24990	1	05905	SMA 0207 E 96	49.9 K OHMS 1% MET FILM
R 75	RN55-21500	1	05905	SMA 0207 E 96	15 K OHMS 1% MET FILM
R 76	RN55-41000	1	05905	SMA 0207 E 96	1 M OHMS 1% MET FILM
R 77	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 78	RN55-02210	1	05905	SMA 0207 E 96	221 OHMS 1% MET FILM
R 79	RN55-02210	1	05905	SMA 0207 E 96	221 OHMS 1% MET FILM
R 80	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM

Parts List for 304CA03500 LEVEL CONTROL PCA Rev L

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
R 81	RN55-23160	1	05905	SMA 0207 E 96	31.6 K OHMS 1% MET FILM
R 82	RAPD-21000	1	73138	89PR10K	10K POT 15T PC MNT
R 84	RN55-23160	1	05905	SMA 0207 E 96	31.6 K OHMS 1% MET FILM
R 85	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 86	RN55-14990	1	05905	SMA 0207 E 96	4.99 K OHMS 1% MET FILM
R 87	RN55-41000	1	05905	SMA 0207 E 96	1 M OHMS 1% MET FILM
R 88	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 89	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 90	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 91	RN55-41000	1	05905	SMA 0207 E 96	1 M OHMS 1% MET FILM
R 92	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 93	RN55-41000	1	05905	SMA 0207 E 96	1 M OHMS 1% MET FILM
R 94	WJIB-05022	1	A0003	923345-05	.5" INSULATED JUMPER
R 95	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 96	RN55-41000	1	05905	SMA 0207 E 96	1 M OHMS 1% MET FILM
R 97	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R 98	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R 100	RN55-21690	1	05905	SMA 0207 E 96	16.9 K OHMS 1% MET FILM
R 101	RN55-22490	1	05905	SMA 0207 E 96	24.9 K OHMS 1% MET FILM
R 102	RN55-22490	1	05905	SMA 0207 E 96	24.9 K OHMS 1% MET FILM
R 103	RN55-00100	1	05905	SMA 0207 E 96	10 OHMS 1% MET FILM
R 104	RN55-24990	1	05905	SMA 0207 E 96	49.9 K OHMS 1% MET FILM
U 1	UINO-01413	1	04713	MC1413P	MC1413P X7 DRIVER .5A
U 2	UINO-01413	1	04713	MC1413P	MC1413P X7 DRIVER .5A
U 4	UONO-00318	1	27014	LM318N	LM318 HIGH SPEED OPAMP
U 5	ULNO-05042	1	32293	IH5042CPE	IH5042CPE SPDT SWITCH
U 6	ULNO-00360	1	27014	LM360N	HI SPEED COMPARATOR
U 7	UONO-00072	1	01295	TL072CP	TL072CP DUAL FET OP AMP
U 8	UCNO-04330	1	04713	MC14433P	MC14433P 3 1/2 DIG A/D
U 9	UANO-00100	1	13919	LOG 100JP	LOG 100JP LOG AMP
U 10	UONO-00074	1	01295	TL074CN	TL074CN QUAD FET OP AMP
U 11	ULNO-02901	1	27014	LM2901N	LM2901N QUAD COMPARATOR
U 12	URPO-79150	1	04713	MC79L15CP	MC79L15 .1A -15V REG
U 13	URPO-79150	1	04713	MC79L15CP	MC79L15 .1A -15V REG
U 14	URPO-78150	1	04713	MC78L15CP	MC78L15 .1A 15V REG
U 15	URPO-78150	1	04713	MC78L15CP	MC78L15 .1A 15V REG
U 16	UONO-00027	1	24355	AD OP27GN	OP27GN LOW DRIFT OP AMP
U 17	UONO-00027	1	24355	AD OP27GN	OP27GN LOW DRIFT OP AMP
U 21	UANO-00100	1	13919	LOG 100JP	LOG 100JP LOG AMP
U 22	UONO-00074	1	01295	TL074CN	TL074CN QUAD FET OP AMP
U 23	UONO-00027	1	24355	AD OP27GN	OP27GN LOW DRIFT OP AMP
U 24	UINO-07542	1	24355	AD7542KN	AD7542KN 12 BIT D/A
VR 1	DRAE-00827	1	04713	1N827	IN827 6.2V REF. DIODE
VR 2	DRAE-00827	1	04713	1N827	IN827 6.2V REF. DIODE
VR 3	DRAE-00827	1	04713	1N827	IN827 6.2V REF. DIODE

Parts List for 304CA01001 OUTPUT PLL PCA Rev D

Item		Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	304CF01001	1	58900		OUTPUT PLL PCB
	2	ETST-06224	1	88245	1280B	TURRET TERMINAL
	3	HQHO-00010	1	05820	651-B	IC HEATSINK
C	1	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	2	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	4	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	5	CC50-03470	1	51642	150-100-W5R-473	.047 UF CERAMIC X7R
C	6	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	7	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	8	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	9	CC50-03470	1	51642	150-100-W5R-473	.047 UF CERAMIC X7R
C	10	CC50-03470	1	51642	150-100-W5R-473	.047 UF CERAMIC X7R
C	11	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	12	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	13	CC50-05470	1	51642	500-050-601-475M	4.7UF CERAMIC Z5U
C	15	CC50-05470	1	51642	500-050-601-475M	4.7UF CERAMIC Z5U
C	16	CC50-05470	1	51642	500-050-601-475M	4.7UF CERAMIC Z5U
C	17	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	18	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	19	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	21	CC50-01100	1	51642	150-100-C0G-101J	100 PF CERAMIC NPO
C	23	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	24	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	26	CT20-06100	1	56289	150D106X9020B2	10 UF 20V TANTALUM
C	27	CT20-06100	1	56289	150D106X9020B2	10 UF 20V TANTALUM
C	28	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	29	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	30	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	31	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
CR	1	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	2	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	3	DSA0-02810	1	28480	5082-2810	5082-2810 SCHOT. DIODE
CR	4	DSA0-02810	1	28480	5082-2810	5082-2810 SCHOT. DIODE
CR	6	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	7	DSA0-00300	1	07263	FDH300	FDH300 LOW LEAK DIODE
CR	8	DSA0-00300	1	07263	FDH300	FDH300 LOW LEAK DIODE
CR	9	DSA0-02810	1	28480	5082-2810	5082-2810 SCHOT. DIODE
CR	10	DSA0-02810	1	28480	5082-2810	5082-2810 SCHOT. DIODE
CR	11	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	12	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	13	DSA0-00300	1	07263	FDH300	FDH300 LOW LEAK DIODE
CR	14	DSA0-00300	1	07263	FDH300	FDH300 LOW LEAK DIODE
DS	1	ILRR-00125	1	58361	MV5077C	RED LED 1/8" DIA
Q	1	QBNS-02222	1	27014	PN2222	PN2222 .5A 30V NPN
R	1	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R	2	RN55-05620	1	05905	SMA 0207 E 96	562 OHMS 1% MET FILM
R	3	RN55-14990	1	05905	SMA 0207 E 96	4.99 K OHMS 1% MET FILM
R	4	RN55-23570	1	05905	SMA 0207 E 96	35.7 K OHMS 1% MET FILM
R	5	RN55-14990	1	05905	SMA 0207 E 96	4.99 K OHMS 1% MET FILM
R	6	RN55-23570	1	05905	SMA 0207 E 96	35.7 K OHMS 1% MET FILM

Parts List for 304CA01001 OUTPUT PLL PCA Rev D

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
R 7	RN55-23570	1	05905	SMA 0207 E 96	35.7 K OHMS 1% MET FILM
R 8	RN55-14990	1	05905	SMA 0207 E 96	4.99 K OHMS 1% MET FILM
R 11	RN55-21210	1	05905	SMA 0207 E 96	12.1 K OHMS 1% MET FILM
R 12	RN55-23320	1	05905	SMA 0207 E 96	33.2 K OHMS 1% MET FILM
R 13	RN55-28250	1	05905	SMA 0207 E 96	82.5 K OHMS 1% MET FILM
R 14	WJIB-05022	1	A0003	923345-05	.5" INSULATED JUMPER
R 16	RN55-41000	1	05905	SMA 0207 E 96	1 M OHMS 1% MET FILM
R 17	RN55-28250	1	05905	SMA 0207 E 96	82.5 K OHMS 1% MET FILM
R 18	RN55-28250	1	05905	SMA 0207 E 96	82.5 K OHMS 1% MET FILM
R 19	RN55-18250	1	05905	SMA 0207 E 96	8.25 K OHMS 1% MET FILM
R 20	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 21	RN55-12740	1	05905	SMA 0207 E 96	2.74 K OHMS 1% MET FILM
R 24	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R 25	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 26	WJIB-05022	1	A0003	923345-05	.5" INSULATED JUMPER
R 29	RN55-12210	1	05905	SMA 0207 E 96	2.21 K OHMS 1% MET FILM
R 30	RN55-18250	1	05905	SMA 0207 E 96	8.25 K OHMS 1% MET FILM
R 31	RN55-01000	1	05905	SMA 0207 E 96	100 OHMS 1% MET FILM
R 32	RN55-28250	1	05905	SMA 0207 E 96	82.5 K OHMS 1% MET FILM
R 33	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 34	RN55-18250	1	05905	SMA 0207 E 96	8.25 K OHMS 1% MET FILM
R 36	RN55-12210	1	05905	SMA 0207 E 96	2.21 K OHMS 1% MET FILM
R 37	RN55-28250	1	05905	SMA 0207 E 96	82.5 K OHMS 1% MET FILM
R 39	RN55-12210	1	05905	SMA 0207 E 96	2.21 K OHMS 1% MET FILM
R 40	RN55-12210	1	05905	SMA 0207 E 96	2.21 K OHMS 1% MET FILM
R 41	RN55-12210	1	05905	SMA 0207 E 96	2.21 K OHMS 1% MET FILM
R 42	RAPD-25000	1	73138	89PR50K	50K POT 15T PC MNT
R 45	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 46	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 47	RN55-13920	1	05905	SMA 0207 E 96	3.92 K OHMS 1% MET FILM
R 48	RC05-26800	1	01121	BB-683-5	68K; 5% 1/8W CARBON
R 49	RC05-26800	1	01121	BB-683-5	68K; 5% 1/8W CARBON
R 50	RC05-26800	1	01121	BB-683-5	68K; 5% 1/8W CARBON
R 51	RC05-26800	1	01121	BB-683-5	68K; 5% 1/8W CARBON
R 52	RN55-02740	1	05905	SMA 0207 E 96	274 OHMS 1% MET FILM
R 53	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 54	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
RM 1	RM7S-05600	1	71450	750-81-R560	560 OHM X 7 SIP NETWRK
U 1	ULN0-05043	1	32293	IH5043CPA	IH5043CPA DUAL SPDT SW
U 2	UON0-00072	1	01295	TL072CP	TL072CP DUAL FET OP AMP
U 3	UEN0-12040	1	04713	MC12040P	MC12040P PHASE/FREQ DET
U 4	UEN0-10216	1	04713	MC10216P	MC10216P TRIPLE RCVR
U 5	UON0-00074	1	01295	TL074CN	TL074CN QUAD FET OP AMP
U 6	UON0-00072	1	01295	TL072CP	TL072CP DUAL FET OP AMP
U 7	UON0-00072	1	01295	TL072CP	TL072CP DUAL FET OP AMP
U 9	URP0-79150	1	04713	MC79L15CP	MC79L15 .1A -15V REG
U 10	URP0-78150	1	04713	MC78L15CP	MC78L15 .1A 15V REG
VR 3	DZAD-04734	1	04713	1N4734A	IN4734 6.2V ZENER
VR 4	DZAD-04734	1	04713	1N4734A	IN4734 6.2V ZENER

Parts List for DIVIDER PCA No. 304CA03100 Rev. D

Item		Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	304CF03100	1	58900	304CF03100	DIVIDER PCB
	2	HSCS-60304	4	06540	RAF 1532-B-6-A	#6 X 3/16SWAGE CLR SPACER
AR	1	MA19-00001	1	24539	MSA-0135-12	0-250MHZ AMP 19DB 1.5DBM
AR	2	MA19-00001	1	24539	MSA-0135-12	0-250MHZ AMP 19DB 1.5DBM
C	1	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	2	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	3	CC50-00330	1	52763	EDPT-33-NP0-5%	33 PF CERAMIC NP0
C	4	CC50-00047	1	51642	100-100-C0G-479J	4.7PF CERAMIC NP0
C	5	CC50-00330	1	52763	EDPT-33-NP0-5%	33 PF CERAMIC NP0
C	6	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	7	CC50-03470	1	51642	150-100-W5R-473	.047 UF CERAMIC X7R
C	8	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	9	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	10	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	11	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	12	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	13	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	14	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	15	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	16	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	17	CC50-00330	1	52763	EDPT-33-NP0-5%	33 PF CERAMIC NP0
C	18	CC50-00330	1	52763	EDPT-33-NP0-5%	33 PF CERAMIC NP0
C	19	CC50-00270	1	52763	EDPT-27-NP0-5%	27 PF CERAMIC NP0
C	20	CC50-00270	1	52763	EDPT-27-NP0-5%	27 PF CERAMIC NP0
C	21	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	22	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
J	1	JRBM-00101	1	98291	51-053-0000	SMB M RTANG PC MOUNT
J	2	JRBM-00101	1	98291	51-053-0000	SMB M RTANG PC MOUNT
L	1	LAD0-05270	1	72259	WEE-2.7	2.7 UH INDUCTOR
L	2	LAD0-04150	1	72259	WEE-.15	.15 UH INDUCTOR
L	3	LAD0-04150	1	72259	WEE-.15	.15 UH INDUCTOR
L	4	LAD0-04150	1	72259	WEE-.15	.15 UH INDUCTOR
Q	1	QBPS-02907	1	27014	PN2907	PN2907 .5A 40V .6W PNP
Q	2	QBPS-02907	1	27014	PN2907	PN2907 .5A 40V .6W PNP
Q	3	QBPS-02907	1	27014	PN2907	PN2907 .5A 40V .6W PNP
Q	4	QBPS-02907	1	27014	PN2907	PN2907 .5A 40V .6W PNP
R	1	RN55-03920	1	05905	SMA 0207 E 96	392 OHMS 1% MET FILM
R	2	RN55-01300	1	05905	SMA 0207 E 96	130 OHMS 1% MET FILM
R	3	RN55-16810	1	05905	SMA 0207 E 96	6.81 K OHMS 1% MET FILM
R	4	RN55-13320	1	05905	SMA 0207 E 96	3.32 K OHMS 1% MET FILM
R	5	RN55-15620	1	05905	SMA 0207 E 96	5.62 K OHMS 1% MET FILM
R	6	RN55-15620	1	05905	SMA 0207 E 96	5.62 K OHMS 1% MET FILM
R	7	RN55-13320	1	05905	SMA 0207 E 96	3.32 K OHMS 1% MET FILM
R	8	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R	9	RN55-11500	1	05905	SMA 0207 E 96	1.5 K OHMS 1% MET FILM
R	10	RN55-00681	1	05905	SMA 0207 E 96	68.1 OHMS 1% MET FILM
R	11	RN55-02210	1	05905	SMA 0207 E 96	221 OHMS 1% MET FILM
R	12	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R	13	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R	14	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
RM	1	RM7S-05600	1	71450	750-81-R560	560 OHM X 7 SIP NETWRK

Parts List for DIVIDER PCA No. 304CA03100 Rev. D

Item		Part Number	Qty	FSCM	Mfr's Part Number	Description
RM	2	RM7S-05600	1	71450	750-81-R560	560 OHM X 7 SIP NETWRK
U	1	URPO-78120	1	04713	MC78L12CP	MC78L12CP .1A 12V REG
U	2	UENO-10131	1	04713	MC10131P	MC10131P DUAL D F/F
U	3	UENO-10131	1	04713	MC10131P	MC10131P DUAL D F/F
U	4	UENO-10131	1	04713	MC10131P	MC10131P DUAL D F/F
U	5	UENO-10102	1	04713	MC10102P	MC10102P QUAD NOR
U	6	UENO-10131	1	04713	MC10131P	MC10131P DUAL D F/F

Parts List for 40-80 MHZ PLL PCA No. 304CA03000 Rev. I

Item		Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	304CF03000	1	58900	304CF03000	40-80 MHZ PLL PCB
	2	ETST-06224	1	88245	1280B	TURRET TERMINAL
	3	HSTS-40304	4	06540	9532B-A-0440	4-40 X 3/16 SWAGE SPACER
	4	HQH0-00010	1	05820	651-B	IC HEATSINK
	5	304CF09100	1	58900	304CF09100	TOP PC SHEILD 1.25 X 2.5
	6	304BF09200	2	58900	304BF09200	PC BD SHIELD COVER
	7	304CF09500	1	58900	304CF09500	BOTTOM PC BD SHIELD 1.25
	8	WJIB-05022	2	A0003	923345-05	.5" INSULATED JUMPER
C	1	CC50-01330	1	51642	150-100-C0G-331J	330 PF CERAMIC NPO
C	2	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	4	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	5	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	7	CT25-R7100	1	90201	TDM107M025L6	100 UF 25V TANTALUM
C	8	CT25-R7100	1	90201	TDM107M025L6	100 UF 25V TANTALUM
C	9	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	10	CC50-01220	1	51642	150-100-C0G-221	220 PF CERAMIC NPO
C	12	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	16	CC50-00750	1	51642	200-100-NP0-750J	75 PF CERAMIC NPO
C	17	CC50-01100	1	51642	150-100-C0G-101J	100 PF CERAMIC NPO
C	18	CC50-00750	1	51642	200-100-NP0-750J	75 PF CERAMIC NPO
C	21	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	22	CC50-02470	1	51642	200-100-W5R-472K	.0047 UF CERAMIC X7R
C	23	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	24	CC50-02470	1	51642	200-100-W5R-472K	.0047 UF CERAMIC X7R
C	25	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	26	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	27	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	28	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	29	CC50-03470	1	51642	150-100-W5R-473	.047 UF CERAMIC X7R
C	30	CC50-03470	1	51642	150-100-W5R-473	.047 UF CERAMIC X7R
C	31	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	32	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	33	CC50-03470	1	51642	150-100-W5R-473	.047 UF CERAMIC X7R
C	34	CK50-03100	1	96733	SG133BX103KS	.01 UF X7R CHIP
C	35	CC50-01100	1	51642	150-100-C0G-101J	100 PF CERAMIC NPO
C	37	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	40	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	41	CC50-00390	1	51642	150-100-C0G-390J	39 PF CERAMIC NPO
C	42	CC50-00560	1	51642	150-100-C0G-560J	56 PF CERAMIC NPO
C	43	CC50-00390	1	51642	150-100-C0G-390J	39 PF CERAMIC NPO
C	44	CC50-00220	1	52763	EDPT-22-NP0-5%	22 PF CERAMIC NPO
C	45	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
CR	1	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	2	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	3	DVA0-00109	1	26629	KV3901	MV109 6-30 PF DIODE
CR	4	DVA0-00109	1	26629	KV3901	MV109 6-30 PF DIODE
DS	1	ILRR-00125	1	58361	MV5077C	RED LED 1/8" DIA
J	1	JRBM-00000	1	98291	51-045-0000	SMB M BULK MOUNT
J	2	JRBM-00000	1	98291	51-045-0000	SMB M BULK MOUNT
L	3	LAB0-03680	1	99800	1026-12	.068 UH INDUCTOR
L	5	LAB0-04100	1	99800	1325-101	.10 UH INDUCTOR

Parts List for 40-80 MHZ PLL PCA No. 304CA03000 Rev. I

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
L 6	LABO-04100	1	99800	1325-101	.10 UH INDUCTOR
L 7	LABO-03470	1	99800	1026-08	.047 UH INDUCTOR
L 8	LABO-03470	1	99800	1026-08	.047 UH INDUCTOR
Q 1	QBNS-02222	1	27014	PN2222	PN2222 .5A 30V NPN
Q 2	QBPS-02907	1	27014	PN2907	PN2907 .5A 40V .6W PNP
Q 3	QBNS-00090	1	04713	BFR90	BFR 90 15 V 5 GHZ FT
Q 4	QBNS-00090	1	04713	BFR90	BFR 90 15 V 5 GHZ FT
R 1	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 2	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 3	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 4	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 5	RN55-18250	1	05905	SMA 0207 E 96	8.25 K OHMS 1% MET FILM
R 6	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R 7	RN55-32000	1	05905	SMA 0207 E 96	200 K OHMS 1% MET FILM
R 9	RN55-12210	1	05905	SMA 0207 E 96	2.21 K OHMS 1% MET FILM
R 10	RN55-21690	1	05905	SMA 0207 E 96	16.9 K OHMS 1% MET FILM
R 11	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R 12	RN55-21470	1	05905	SMA 0207 E 96	14.7 K OHMS 1% MET FILM
R 13	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 14	RN55-00511	1	05905	SMA 0207 E 96	51.1 OHMS 1% MET FILM
R 15	RC05-21000	1	01121	BB-103-5	10K; 5% 1/8W CARBON
R 16	RC05-11000	1	01121	BB-102-5	1.0K; 5% 1/8W CARBON
R 17	RC05-11500	1	01121	BB-152-5	1.5K; 5% 1/8W CARBON
R 18	RC05-11000	1	01121	BB-102-5	1.0K; 5% 1/8W CARBON
R 19	RC05-11000	1	01121	BB-102-5	1.0K; 5% 1/8W CARBON
R 20	RC05-00510	1	01121	BB510-5	51 OHMS 5% 1/8W CARBON
R 21	RN55-00100	1	05905	SMA 0207 E 96	10 OHMS 1% MET FILM
R 22	RN55-22740	1	05905	SMA 0207 E 96	27.4 K OHMS 1% MET FILM
R 23	RN55-21470	1	05905	SMA 0207 E 96	14.7 K OHMS 1% MET FILM
R 24	RN55-22740	1	05905	SMA 0207 E 96	27.4 K OHMS 1% MET FILM
R 25	RN55-05620	1	05905	SMA 0207 E 96	562 OHMS 1% MET FILM
R 28	RN55-00681	1	05905	SMA 0207 E 96	68.1 OHMS 1% MET FILM
R 29	RN55-03920	1	05905	SMA 0207 E 96	392 OHMS 1% MET FILM
R 30	RN55-01300	1	05905	SMA 0207 E 96	130 OHMS 1% MET FILM
R 32	RN55-05620	1	05905	SMA 0207 E 96	562 OHMS 1% MET FILM
R 33	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 34	RC05-13900	1	01121	BB-392-5	3.9K; 5% 1/8W CARBON
R 35	RC05-05600	1	01121	RC05GF561-J	560 OHM 5% 1/8W CARBON
R 36	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 37	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
U 1	UONO-00072	1	01295	TL072CP	TL072CP DUAL FET OP AMP
U 3	UCNO-51460	1	04713	MC145146P	MC145146P FREQ SYNTH
U 4	MMDC-00001	1	15542	ASK-1	1-600MHZ 600MHZ IF MIX
U 5	UENO-12013	1	04713	MC12013P	MC12013 DIV 10/11 600MHZ
U 6	UENO-10231	1	04713	MC10231P	MC10231P DUAL D F/F
U 7	URPO-78120	1	04713	MC78L12CP	MC78L12CP .1A 12V REG
U 8	URPO-78050	1	04713	MC78L05	MC78L05 .1A 5V REG

Parts List for INTERMEDIATE PLL PCA No. 304CA02700 Rev. G

Item		Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	304CF02700	1	58900	304CF02700	INTERMEDIATE PLL PCB
	2	ETST-06224	1	88245	1280B	TURRET TERMINAL
	3	HSTS-40304	4	06540	9532B-A-0440	4-40 X 3/16 SWAGE SPACER
	4	304CF09100	1	58900	304CF09100	TOP PC SHEILD 1.25 X 2.5
	5	304BF09200	2	58900	304BF09200	PC BD SHIELD COVER
	6	HQHO-00010	1	05820	651-B	IC HEATSINK
	7	304CF09500	1	58900	304CF09500	BOTTOM PC BD SHIELD 1.25
	8	HBHS-A2403	1	96906	MIL STD	10-24 X 3/16 SET SCREW
AR	2	MA19-00001	1	24539	MSA-0135-12	0-250MHZ AMP 19DB 1.5DBM
C	1	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	2	CT25-R7100	1	90201	TDM107M025L6	100 UF 25V TANTALUM
C	3	CT25-R7100	1	90201	TDM107M025L6	100 UF 25V TANTALUM
C	4	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	5	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	6	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	7	CC50-01470	1	51642	150-100-C0G-471	470 PF CERAMIC NPO
C	8	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	9	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	10	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	11	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	12	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	13	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	14	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	15	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	16	CK50-00150	1	96733	SG91BY150JSA	15 PF NPO CHIP
C	18	CK50-00050	1	96733	SG0805BY5R0DSA	5 PF NPO CHIP
C	19	CK50-00150	1	96733	SG91BY150JSA	15 PF NPO CHIP
C	21	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	22	CK50-03100	1	96733	SG133BX103KS	.01 UF X7R CHIP
C	23	CK50-03100	1	96733	SG133BX103KS	.01 UF X7R CHIP
C	24	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	25	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	27	CK50-03100	1	96733	SG133BX103KS	.01 UF X7R CHIP
C	28	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	29	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	30	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	31	CC50-03470	1	51642	150-100-W5R-473	.047 UF CERAMIC X7R
C	33	CK50-03100	1	96733	SG133BX103KS	.01 UF X7R CHIP
C	34	CC50-01100	1	51642	150-100-C0G-101J	100 PF CERAMIC NPO
C	37	CC50-00180	1	51642	150-100-C0G-180J	18 PF CERAMIC NPO
C	38	CC50-00180	1	51642	150-100-C0G-180J	18 PF CERAMIC NPO
C	39	CC50-01220	1	51642	150-100-C0G-221	220 PF CERAMIC NPO
C	40	CC50-01220	1	51642	150-100-C0G-221	220 PF CERAMIC NPO
C	42	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	43	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	44	CC50-01100	1	51642	150-100-C0G-101J	100 PF CERAMIC NPO
C	45	CC50-00220	1	52763	EDPT-22-NPO-5%	22 PF CERAMIC NPO
C	46	CC50-01100	1	51642	150-100-C0G-101J	100 PF CERAMIC NPO
CR	1	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	2	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	4	DVA0-00109	1	26629	KV3901	MV109 6-30 PF DIODE

Parts List for INTERMEDIATE PLL PCA No. 304CA02700 Rev. G

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
CR 5	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR 6	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR 7	DSA0-00300	1	07263	FDH300	FDH300 LOW LEAK DIODE
DS 1	ILRR-00125	1	58361	MV5077C	RED LED 1/8" DIA
J 1	JRBM-00000	1	98291	51-045-0000	SMB M BULK MOUNT
L 1	LAD0-06270	1	72259	WEE-27	27 UH INDUCTOR
L 2	LAD0-05270	1	72259	WEE-2.7	2.7 UH INDUCTOR
L 3	LAD0-04680	1	72259	WEE-068	.68 uH INDUCTOR
L 5	LAB0-03470	1	99800	1026-08	.047 UH INDUCTOR
L 6	LAB0-03470	1	99800	1026-08	.047 UH INDUCTOR
L 7	LAD0-04330	1	72259	WEE-.33	.33 UH INDUCTOR
Q 1	QBNS-02222	1	27014	PN2222	PN2222 .5A 30V NPN
Q 2	QBPS-02907	1	27014	PN2907	PN2907 .5A 40V .6W PNP
Q 3	QBNS-00090	1	04713	BFR90	BFR 90 15 V 5 GHZ FT
Q 4	QBNS-00090	1	04713	BFR90	BFR 90 15 V 5 GHZ FT
R 1	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 2	RN55-12740	1	05905	SMA 0207 E 96	2.74 K OHMS 1% MET FILM
R 3	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 4	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 5	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 6	RN55-21690	1	05905	SMA 0207 E 96	16.9 K OHMS 1% MET FILM
R 7	RN55-12210	1	05905	SMA 0207 E 96	2.21 K OHMS 1% MET FILM
R 8	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 9	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 10	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R 11	RN55-21210	1	05905	SMA 0207 E 96	12.1 K OHMS 1% MET FILM
R 12	RN55-25620	1	05905	SMA 0207 E 96	56.2 K OHMS 1% MET FILM
R 13	RC05-21000	1	01121	BB-103-5	10K; 5% 1/8W CARBON
R 14	RC05-11000	1	01121	BB-102-5	1.0K; 5% 1/8W CARBON
R 15	RC05-11500	1	01121	BB-152-5	1.5K; 5% 1/8W CARBON
R 16	RN55-24750	1	05905	SMA 0207 E 96	47.5 K OHMS 1% MET FILM
R 17	RN55-24750	1	05905	SMA 0207 E 96	47.5 K OHMS 1% MET FILM
R 18	RN55-34990	1	05905	SMA 0207 E 96	499 K OHMS 1% MET FILM
R 19	RN55-34990	1	05905	SMA 0207 E 96	499 K OHMS 1% MET FILM
R 20	RN55-05620	1	05905	SMA 0207 E 96	562 OHMS 1% MET FILM
R 21	RC05-11000	1	01121	BB-102-5	1.0K; 5% 1/8W CARBON
R 22	RC05-00220	1	01121	BB-220-5	22 OHMS 5% 1/8W CARBON
R 23	RC05-01000	1	01121	BB-101-5	100ohms;5% 1/8W CARBON
R 26	RN55-05620	1	05905	SMA 0207 E 96	562 OHMS 1% MET FILM
R 27	RN55-05620	1	05905	SMA 0207 E 96	562 OHMS 1% MET FILM
R 28	RN55-03920	1	05905	SMA 0207 E 96	392 OHMS 1% MET FILM
R 29	RN55-01500	1	05905	SMA 0207 E 96	150 OHMS 1% MET FILM
R 30	RN55-01500	1	05905	SMA 0207 E 96	150 OHMS 1% MET FILM
R 31	RN55-03920	1	05905	SMA 0207 E 96	392 OHMS 1% MET FILM
R 32	RN55-03920	1	05905	SMA 0207 E 96	392 OHMS 1% MET FILM
R 33	RN55-00511	1	05905	SMA 0207 E 96	51.1 OHMS 1% MET FILM
R 34	RC05-00100	1	01121	BB-100-5	10 OHMS 5% 1/8W CARBON
R 35	RN55-03320	1	05905	SMA 0207 E 96	332 OHMS 1% MET FILM
R 36	RN55-05620	1	05905	SMA 0207 E 96	562 OHMS 1% MET FILM
R 37	RN55-01300	1	05905	SMA 0207 E 96	130 OHMS 1% MET FILM
R 38	RN55-00511	1	05905	SMA 0207 E 96	51.1 OHMS 1% MET FILM

Parts List for INTERMEDIATE PLL PCA No. 304CA02700 Rev. G

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
R 39	RC05-04700	1	01121	BB-471-5	470ohm; 5% 1/8W CARBON
R 40	RC05-13900	1	01121	BB-392-5	3.9K; 5% 1/8W CARBON
R 42	RN55-12210	1	05905	SMA 0207 E 96	2.21 K OHMS 1% MET FILM
R 43	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 44	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
U 1	UONO-00072	1	01295	TL072CP	TL072CP DUAL FET OP AMP
U 2	URPO-78120	1	04713	MC78L12CP	MC78L12CP .1A 12V REG
U 3	UENO-12040	1	04713	MC12040P	MC12040P PHASE/FREQ DET
U 4	MMDC-00001	1	15542	ASK-1	1-600MHZ 600MHZ IF MIX
U 5	UENO-10131	1	04713	MC10131P	MC10131P DUAL D F/F
U 6	UENO-10216	1	04713	MC10216P	MC10216P TRIPLE RCVR
U 7	UONO-00072	1	01295	TL072CP	TL072CP DUAL FET OP AMP

Parts List for HI RESOLUTION PCA No. 304CA03400 Rev. F

Item		Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	304CF03400	1	58900	304CF03400	HI RESOLUTION PCB
	2	HSTS-40304	4	06540	9532B-A-0440	4-40 X 3/16 SWAGE SPACER
	3	HQHO-00010	2	05820	651-B	IC HEATSINK
	4	304CF09100	1	58900	304CF09100	TOP PC SHEILD 1.25 X 2.5
	5	304BF09200	2	58900	304BF09200	PC BD SHIELD COVER
	6	304CF09500	1	58900	304CF09500	BOTTOM PC BD SHIELD 1.25
	7	ETST-06224	1	88245	1280B	TURRET TERMINAL
AR	1	MA19-00001	1	24539	MSA-0135-12	0-250MHZ AMP 19DB 1.5DBM
AR	2	MA19-00001	1	24539	MSA-0135-12	0-250MHZ AMP 19DB 1.5DBM
C	1	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	2	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	3	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	4	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	5	CC50-00270	1	52763	EDPT-27-NP0-5%	27 PF CERAMIC NPO
C	6	CC50-00270	1	52763	EDPT-27-NP0-5%	27 PF CERAMIC NPO
C	7	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	8	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	10	CK50-03100	1	96733	SG133BX103KS	.01 UF X7R CHIP
C	11	CK50-00050	1	96733	SG0805BY5R0DSA	5 PF NPO CHIP
C	12	CK50-00150	1	96733	SG91BY150JSA	15 PF NPO CHIP
C	13	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	14	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	15	CC50-03470	1	51642	150-100-W5R-473	.047 UF CERAMIC X7R
C	16	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	17	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	18	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	19	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	20	CT25-R7100	1	90201	TDM107M025L6	100 UF 25V TANTALUM
C	21	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	22	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	24	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	27	CC50-02470	1	51642	200-100-W5R-472K	.0047 UF CERAMIC X7R
C	28	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	29	CC50-02470	1	51642	200-100-W5R-472K	.0047 UF CERAMIC X7R
C	30	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	31	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	32	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	33	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	34	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	35	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	37	CC50-02470	1	51642	200-100-W5R-472K	.0047 UF CERAMIC X7R
C	38	CC50-03470	1	51642	150-100-W5R-473	.047 UF CERAMIC X7R
CR	1	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	2	DVA0-00109	1	26629	KV3901	MV109 6-30 PF DIODE
CR	3	DVA0-00109	1	26629	KV3901	MV109 6-30 PF DIODE
CR	4	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
DS	1	ILRR-00125	1	58361	MV5077C	RED LED 1/8" DIA
J	1	JRBM-00000	1	98291	51-045-0000	SMB M BULK MOUNT
L	1	LAD0-04150	1	72259	WEE-.15	.15 UH INDUCTOR
Q	1	QBNS-00090	1	04713	BFR90	BFR 90 15 V 5 GHZ FT
Q	4	QBNS-02222	1	27014	PN2222	PN2222 .5A 30V NPN

Parts List for HI RESOLUTION PCA No. 304CA03400 Rev. F

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
Q 5	QBPS-02907	1	27014	PN2907	PN2907 .5A 40V .6W PNP
R 5	RN55-01000	1	05905	SMA 0207 E 96	100 OHMS 1% MET FILM
R 6	RC05-13900	1	01121	BB-392-5	3.9K; 5% 1/8W CARBON
R 7	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 8	RC05-21000	1	01121	BB-103-5	10K; 5% 1/8W CARBON
R 9	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 10	RN55-15620	1	05905	SMA 0207 E 96	5.62 K OHMS 1% MET FILM
R 11	RN55-00562	1	05905	SMA 0207 E 96	56.2 OHMS 1% MET FILM
R 13	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 15	RN55-00100	1	05905	SMA 0207 E 96	10 OHMS 1% MET FILM
R 17	RN55-00100	1	05905	SMA 0207 E 96	10 OHMS 1% MET FILM
R 23	RN55-03920	1	05905	SMA 0207 E 96	392 OHMS 1% MET FILM
R 24	RN55-01300	1	05905	SMA 0207 E 96	130 OHMS 1% MET FILM
R 25	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R 26	RN55-32000	1	05905	SMA 0207 E 96	200 K OHMS 1% MET FILM
R 27	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R 28	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 29	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 30	RN55-22740	1	05905	SMA 0207 E 96	27.4 K OHMS 1% MET FILM
R 31	RN55-26040	1	05905	SMA 0207 E 96	60.4 K OHMS 1% MET FILM
R 32	RN55-26040	1	05905	SMA 0207 E 96	60.4 K OHMS 1% MET FILM
R 33	RN55-22740	1	05905	SMA 0207 E 96	27.4 K OHMS 1% MET FILM
R 34	RC05-11000	1	01121	BB-102-5	1.0K; 5% 1/8W CARBON
R 35	RC05-11500	1	01121	BB-152-5	1.5K; 5% 1/8W CARBON
R 36	RN55-12210	1	05905	SMA 0207 E 96	2.21 K OHMS 1% MET FILM
R 37	RN55-21690	1	05905	SMA 0207 E 96	16.9 K OHMS 1% MET FILM
R 38	RN55-13920	1	05905	SMA 0207 E 96	3.92 K OHMS 1% MET FILM
R 39	RN55-03920	1	05905	SMA 0207 E 96	392 OHMS 1% MET FILM
R 40	RC05-00820	1	01121	BB-820-5	82 ohms;5% 1/8W CARBON
R 41	RC05-00560	1	01121	BB-560-5	56 OHMS 5% 1/8W CARBON
R 42	RC05-00560	1	01121	BB-560-5	56 OHMS 5% 1/8W CARBON
R 43	RN55-00511	1	05905	SMA 0207 E 96	51.1 OHMS 1% MET FILM
R 44	RC05-00510	1	01121	BB510-5	51 OHMS 5% 1/8W CARBON
RM 1	RM7S-05600	1	71450	750-81-R560	560 OHM X 7 SIP NETWRK
U 2	UINO-03393	1	04713	MC3393P	MC3393P 40MHZ 15/16 CTR
U 4	MMDC-00001	1	15542	ASK-1	1-600MHZ 600MHZ IF MIX
U 5	UCNO-51460	1	04713	MC145146P	MC145146P FREQ SYNTH
U 7	UONO-00072	1	01295	TL072CP	TL072CP DUAL FET OP AMP
U 8	URPO-78120	1	04713	MC78L12CP	MC78L12CP .1A 12V REG
U 9	UENO-12011	1	04713	MC12011P	MC12011 DIV BY 8/9 600MHZ
U 10	UENO-10131	1	04713	MC10131P	MC10131P DUAL D F/F
U 11	UENO-10102	1	04713	MC10102P	MC10102P QUAD NOR

Parts List for 300 MHz PLL PCA No. 304CA02200 Rev. I

Item		Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	304CF02200	1	58900	304CF02200	300 MHZ PLL PCB
	2	HQH0-00010	5	05820	651-B	IC HEATSINK
	4	304CF09300	1	58900	304CF09300	TOP PC SHIELD 1.5 X 1.5
	5	304BF09400	1	58900	304BF09400	PC BD SHIELD COVER
	6	HSTS-40304	4	06540	9532B-A-0440	4-40 X 3/16 SWAGE SPACER
	7	304CF09600	1	58900	304CF09600	BOTTOM PC BD SHIELD 1.5 X
	8	304BF09700	1	58900	304BF09700	BOTTOM PC BD SHIELD COVER
AR	1	MA19-00001	1	24539	MSA-0135-12	0-250MHZ AMP 19DB 1.5DBM
AR	2	MA19-00001	1	24539	MSA-0135-12	0-250MHZ AMP 19DB 1.5DBM
C	1	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	2	CC50-00680	1	51642	150-100-C0G-680J	68 PF CERAMIC NPO
C	3	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	4	CC50-00680	1	51642	150-100-C0G-680J	68 PF CERAMIC NPO
C	7	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	8	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	9	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	10	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	12	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	15	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	16	CC50-02470	1	51642	200-100-W5R-472K	.0047 UF CERAMIC X7R
C	17	CC50-02470	1	51642	200-100-W5R-472K	.0047 UF CERAMIC X7R
C	18	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	19	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	20	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	21	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	22	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	23	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	24	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	25	CC50-01100	1	51642	150-100-C0G-101J	100 PF CERAMIC NPO
C	26	CC50-01100	1	51642	150-100-C0G-101J	100 PF CERAMIC NPO
C	27	CT25-R7100	1	90201	TDM107M025L6	100 UF 25V TANTALUM
CR	1	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	2	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	3	DSA0-00300	1	07263	FDH300	FDH300 LOW LEAK DIODE
DS	1	ILRR-00125	1	58361	MV5077B	RED LED 1/8" DIA
J	1	JRBM-00000	1	98291	51-045-0000	SMB M BULK MOUNT
J	2	JRBM-00000	1	98291	51-045-0000	SMB M BULK MOUNT
L	1	LAB0-03820	1	99800	1026-14	.082uH INDUCTOR
L	2	LAD0-05270	1	72259	WEE-2.7	2.7 UH INDUCTOR
R	1	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R	2	RC05-03300	1	01121	BB-331-5	330ohms 5% 1/8W CARBON
R	3	RC05-03300	1	01121	BB-331-5	330ohms 5% 1/8W CARBON
R	4	RC05-11000	1	01121	BB-102-5	1.0K; 5% 1/8W CARBON
R	5	RC05-11000	1	01121	BB-102-5	1.0K; 5% 1/8W CARBON
R	6	RC05-00220	1	01121	BB-220-5	22 OHMS 5% 1/8W CARBON
R	7	RC05-06800	1	01121	BB-681-5	680ohm; 5% 1/8W CARBON
R	8	RC05-02200	1	01121	BB-221-5	220ohms;5% 1/8W CARBON
R	9	RC05-21200	1	01121	BB-123-5	12K; 5% 1/8W CARBON
R	10	RC05-25600	1	01121	BB-563-5	56K; 5% 1/8W CARBON
R	12	RC05-32700	1	01121	BB-274-5	270 K 5% 1/8W CARBON
R	13	RC05-11000	1	01121	BB-102-5	1.0K; 5% 1/8W CARBON

Parts List for 300 MHz PLL PCA No. 304CA02200 Rev. I

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
R 14	RC05-03300	1	01121	BB-331-5	330ohms 5% 1/8W CARBON
R 15	RC05-03300	1	01121	BB-331-5	330ohms 5% 1/8W CARBON
R 18	RC05-05600	1	01121	RC05GF561-J	560 OHM 5% 1/8W CARBON
R 19	RC05-16800	1	01121	BB-682-5	6.8K; 5% 1/8W CARBON
R 20	RC05-16800	1	01121	BB-682-5	6.8K; 5% 1/8W CARBON
R 21	RC05-05600	1	01121	RC05GF561-J	560 OHM 5% 1/8W CARBON
R 22	RC05-18200	1	01121	BB-822-5	8.2K; 5% 1/8W CARBON
R 23	RC05-18200	1	01121	BB-822-5	8.2K; 5% 1/8W CARBON
R 24	RC05-04700	1	01121	BB-471-5	470ohm; 5% 1/8W CARBON
R 25	RC05-21000	1	01121	BB-103-5	10K; 5% 1/8W CARBON
R 26	RC05-12200	1	01121	BB-222-5	2.2K; 5% 1/8W CARBON
R 27	RC05-13300	1	01121	BB-332-5	3.3K; 5% 1/8W CARBON
R 28	RC05-00470	1	01121	BB-470-5	47 OHMS 5% 1/8W CARBON
R 29	RC05-21000	1	01121	BB-103-5	10K; 5% 1/8W CARBON
R 30	RC05-00510	1	01121	BB510-5	51 OHMS 5% 1/8W CARBON
R 31	RC05-00510	1	01121	BB510-5	51 OHMS 5% 1/8W CARBON
R 32	RN55-01000	1	05905	SMA 0207 E 96	100 OHMS 1% MET FILM
RM 1	RM7S-05600	1	71450	750-81-R560	560 OHM X 7 SIP NETWRK
RM 2	RM7S-21000	1	71450	750-81-R10K	10K OHM X 7 SIP NETWRK
RM 3	RM7S-05600	1	71450	750-81-R560	560 OHM X 7 SIP NETWRK
U 1	UEN1-10136	1	04713	MC10H136P	MC10H136P 250MHZ DIV 16
U 2	UEN0-10109	1	04713	MC10109P	MC10109P DUAL OR/NOR
U 3	UEN1-10136	1	04713	MC10H136P	MC10H136P 250MHZ DIV 16
U 4	MMDC-00001	1	15542	ASK-1	1-600MHZ 600MHZ IF MIX
U 5	ULN0-02901	1	27014	LM2901N	LM2901N QUAD COMPARATOR
U 6	ULN0-02901	1	27014	LM2901N	LM2901N QUAD COMPARATOR
U 7	UEN1-10131	1	04713	MC10H131P	MC10H131P DUAL D F/F
U 8	UEN0-12040	1	04713	MC12040P	MC12040P PHASE/FREQ DET
U 9	ULN0-00311	1	27014	LM311N	LM311N COMPARATOR
U 10	UTN0-01751	1	01295	SN74LS175N	SN74LS175 QUAD D F/F
U 11	UTN0-01751	1	01295	SN74LS175N	SN74LS175 QUAD D F/F
U 12	UTN0-00021	1	01295	SN74LS02N	SN74LS02 QUAD NOR
U 14	UON0-00072	1	01295	TL072CP	TL072CP DUAL FET OP AMP
U 15	UEN0-10138	1	04713	MC10138P	MC10138P BI-QUINARY CTR
U 16	UON0-00027	1	24355	AD OP27GN	OP27GN LOW DRIFT OP AMP
U 17	URP0-78120	1	04713	MC78L12CP	MC78L12CP .1A 12V REG

Parts List for 110 MHz REF PLL PCA No. 304CA05600 Rev. E

Item		Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	304CF05600	1	58900	304CF05600	110 MHz REF PLL PCB
	2	ETST-06224	1	88245	1280B	TURRET TERMINAL
	3	HSCS-60304	4	06540	RAF 1532-B-6-A	#6 X 3/16SWAGE CLR SPACER
	4	HQHO-00010	3	05820	651-B	IC HEATSINK
C	1	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	2	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	3	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	4	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	5	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	6	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	7	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	8	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	9	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	10	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	11	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	12	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	13	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	14	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	15	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	16	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	17	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	18	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	19	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	20	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	21	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	22	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	23	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	24	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	25	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
CR	1	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	2	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	3	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	4	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	5	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	6	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	7	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
DS	1	ILRR-00125	1	58361	MV5077C	RED LED 1/8" DIA
L	1	LAD0-05270	1	72259	WEE-2.7	2.7 UH INDUCTOR
L	2	LAD0-05270	1	72259	WEE-2.7	2.7 UH INDUCTOR
Q	1	QBNS-02222	1	27014	PN2222	PN2222 .5A 30V NPN
Q	2	QBPS-03645	1	27014	PN3645	PN3645 .5A 60V .6W PNP
Q	3	QBPS-03645	1	27014	PN3645	PN3645 .5A 60V .6W PNP
Q	4	QBNS-00012	1	04713	MPSA12	MPSA12 20K HFE NPN
Q	5	QBPS-02907	1	27014	PN2907	PN2907 .5A 40V .6W PNP
R	1	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R	2	RN55-04750	1	05905	SMA 0207 E 96	475 OHMS 1% MET FILM
R	3	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R	4	RN55-32740	1	05905	SMA 0207 E 96	274 K OHMS 1% MET FILM
R	5	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
R	6	RN55-24750	1	05905	SMA 0207 E 96	47.5 K OHMS 1% MET FILM
R	7	RN55-24750	1	05905	SMA 0207 E 96	47.5 K OHMS 1% MET FILM

Parts List for 110 MHz REF PLL PCA No. 304CA05600 Rev. E

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
R 8	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 9	RN55-33010	1	05905	SMA 0207 E 96	301 K OHMS 1% MET FILM
R 10	RN55-25620	1	05905	SMA 0207 E 96	56.2 K OHMS 1% MET FILM
R 11	RN55-21210	1	05905	SMA 0207 E 96	12.1 K OHMS 1% MET FILM
R 12	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 13	RN55-01300	1	05905	SMA 0207 E 96	130 OHMS 1% MET FILM
R 14	RN55-00825	1	05905	SMA 0207 E 96	82.5 OHMS 1% MET FILM
R 15	RN55-32740	1	05905	SMA 0207 E 96	274 K OHMS 1% MET FILM
R 16	RN55-05620	1	05905	SMA 0207 E 96	562 OHMS 1% MET FILM
R 17	RN55-05620	1	05905	SMA 0207 E 96	562 OHMS 1% MET FILM
R 18	RN55-05620	1	05905	SMA 0207 E 96	562 OHMS 1% MET FILM
R 19	RN55-05620	1	05905	SMA 0207 E 96	562 OHMS 1% MET FILM
R 20	RN55-05620	1	05905	SMA 0207 E 96	562 OHMS 1% MET FILM
R 21	RN55-22210	1	05905	SMA 0207 E 96	22.1 K OHMS 1% MET FILM
R 22	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R 23	RN55-04750	1	05905	SMA 0207 E 96	475 OHMS 1% MET FILM
R 24	RN55-21500	1	05905	SMA 0207 E 96	15 K OHMS 1% MET FILM
R 25	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 26	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 27	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 28	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 29	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 30	RC20-00680	1	01121	EB-680-5	68 OHMS 5% 1/2W CARBON
U 1	UONO-00072	1	01295	TL072CP	TL072CP DUAL FET OP AMP
U 2	URPO-78150	1	04713	MC78L15CP	MC78L15 .1A 15V REG
U 3	URPO-79120	1	04713	MC79L12CP	MC79L12 .1A -12V REG
U 4	UENO-12040	1	04713	MC12040P	MC12040P PHASE/FREQ DET
U 5	UENO-12013	1	04713	MC12013P	MC12013 DIV 10/11 600MHZ
U 6	UENO-10216	1	04713	MC10216P	MC10216P TRIPLE RCVR
U 7	UENO-10124	1	04713	MC10124P	MC10124P QUAD TTL TO ECL
U 8	UTNO-01322	1	01295	SN74HC132N	SN74HC132N 4X SCHMIDT NAN
U 9	URPO-78050	1	04713	MC78L05	MC78L05 .1A 5V REG

Parts List for 304CA02401 YIG DRIVER PCA Rev F

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	304CF02401	1	58900		YIG DRIVER PCB
2	ETST-06224	1	88245	1280B	TURRET TERMINAL
3	WJIB-05022	1	A0003	923345-05	.5" INSULATED JUMPER
C 1	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C 3	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C 6	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C 7	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C 9	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C 10	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C 11	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C 12	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C 13	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C 15	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C 16	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C 17	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C 18	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C 19	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C 20	CC50-00470	1	52763	EDPT-47-NPO-5%	47 PF CERAMIC NPO
C 21	CC50-00470	1	52763	EDPT-47-NPO-5%	47 PF CERAMIC NPO
C 22	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C 23	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C 25	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C 26	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C 27	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C 28	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C 29	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C 30	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C 31	CT20-06100	1	56289	150D106X9020B2	10 UF 20V TANTALUM
CR 1	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
Q 1	QBNS-02222	1	27014	PN2222	PN2222 .5A 30V NPN
R 1	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R 2	RN55-?????	1	05905	SMA 0207 E 96	SELECTED IN TEST
R 3	RN55-?????	1	05905	SMA 0207 E 96	SELECTED IN TEST
R 4	RAPD-12000	1	73138	89PR2K	2K POT 15T PC MNT
R 5	RN55-18250	1	05905	SMA 0207 E 96	8.25 K OHMS 1% MET FILM
R 6	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 7	RN55-?????	1	05905	SMA 0207 E 96	SELECTED IN TEST
R 8	RN55-?????	1	05905	SMA 0207 E 96	SELECTED IN TEST
R 9	RAPD-12000	1	73138	89PR2K	2K POT 15T PC MNT
R 10	RN55-15620	1	05905	SMA 0207 E 96	5.62 K OHMS 1% MET FILM
R 11	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 12	RN55-01000	1	05905	SMA 0207 E 96	100 OHMS 1% MET FILM
R 13	RN55-14990	1	05905	SMA 0207 E 96	4.99 K OHMS 1% MET FILM
R 15	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 16	RN55-19090	1	05905	SMA 0207 E 96	9.09 K OHMS 1% MET FILM
R 17	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 18	RN55-?????	1	05905	SMA 0207 E 96	SELECTED IN TEST
R 19	RN55-14990	1	05905	SMA 0207 E 96	4.99 K OHMS 1% MET FILM
R 20	RAPD-15000	1	73138	89PR5K	5K POT 15T PC MNT
R 21	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM

Parts List for 304CA02401 YIG DRIVER PCA Rev F

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
R 22	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R 23	RAPD-31000	1	73138	89PR100K	100K POT 15T PC MNT
R 24	RAPD-31000	1	73138	89PR100K	100K POT 15T PC MNT
R 25	RN55-41000	1	05905	SMA 0207 E 96	1 M OHMS 1% MET FILM
R 26	RN55-41000	1	05905	SMA 0207 E 96	1 M OHMS 1% MET FILM
R 27	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R 28	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R 29	RAPD-12000	1	73138	89PR2K	2K POT 15T PC MNT
R 30	RN55-04750	1	05905	SMA 0207 E 96	475 OHMS 1% MET FILM
R 31	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R 32	RN55-00475	1	05905	SMA 0207 E 96	47.5 OHMS 1% MET FILM
U 1	UINO-07542	1	24355	AD7542KN	AD7542KN 12 BIT D/A
U 2	UONO-00027	1	24355	AD OP27GN	OP27GN LOW DRIFT OP AMP
U 3	UONO-00027	1	24355	AD OP27GN	OP27GN LOW DRIFT OP AMP
U 5	URPO-79150	1	04713	MC79L15CP	MC79L15 .1A -15V REG
U 6	URPO-78150	1	04713	MC78L15CP	MC78L15 .1A 15V REG
U 7	UONO-00072	1	01295	TL072CP	TL072CP DUAL FET OP AMP
U 8	UTNO-00041	1	01295	SN74LS04N	SN74LS04 HEX INVERTER
U 9	ULNO-05053	1	32293	IH5053CJE	IH5053 QUAD ANALOG SWITC
U 10	ULNO-05053	1	32293	IH5053CJE	IH5053 QUAD ANALOG SWITC
VR 1	DRAE-00827	1	04713	1N827	IN827 6.2V REF. DIODE

Parts List for TCXO PCA No. 101BA09702 Rev. B

Item		Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	101BF09702	1	58900	101BF09702	TCXO PCB
C	1	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	2	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	3	CT20-06100	1	56289	150D106X9020B2	10 UF 20V TANTALUM
IC	1	URP0-78120	1	04713	MC78L12CP	MC78L12CP .1A 12V REG
R	1	RN55-01000	1	05905	SMA 0207 E 96	100 OHMS 1% MET FILM
U	1	UTN0-01322	1	01295	SN74HC132N	SN74HC132N 4X SCHMIDT NAN
X	1	101BC18300	1	58900	101BC18300	10 MHZ TCXO SPECIFICATION

Parts List for POWER SUPPLY PCA No. 304BA01100 Rev. D

Item		Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	304BF01100	1	58900	304BF01100	POWER SUPPLY PCB
	2	ETSB-06224	11	88245	1309B	BIFURCATED TERMINAL 15/64
	3	HQHO-02200	2	13103	6106B-16	TO220 HEATSINK
	4	201BF01200	1	58900	201BF01200	CAPACITOR RETAINER
	5	HSTH-42103	1	56563	2070-440-SSO	5/16 HEX STANDOFF 1 5/16L
	6	HSTS-40704	4	55566	3050-B-440-A	4-40 X 7/16 SWAGE SPACER
	7	ETSB-06216	6	88245	2000B	BIFURCATED TERMINAL 5/32
C	1	CE35-08220	1	56289	503D228F035TJ	>2200UF >35V ELECT.
C	2	CE35-08220	1	56289	503D228F035TJ	>2200UF >35V ELECT.
C	3	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	4	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	5	CE63-07220	1	56289	501D227F063PR	220 UF 63V ELECT.
C	6	CE35-08220	1	56289	503D228F035TJ	>2200UF >35V ELECT.
C	7	CE35-08220	1	56289	503D228F035TJ	>2200UF >35V ELECT.
C	8	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	9	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
CR	1	DPAB-05391	1	04713	1N5391	IN5391 1.5A 35V DIODE
CR	2	DPAB-05391	1	04713	1N5391	IN5391 1.5A 35V DIODE
CR	3	DBMC-00001	1	26923	CSB1	1 A DIP BRIDGE
Q	1	QBNS-00042	1	04713	MPSA42	MPSA42 300V NPN
Q	2	QBNS-00042	1	04713	MPSA42	MPSA42 300V NPN
R	1	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
R	2	RN55-00121	1	05905	SMA 0207 E 96	12.1 OHMS 1% MET FILM
R	3	RW03-00030	1	91637	RS-2B-3-1	3ohm 2W WIREWOUND
U	1	URCO-07918	1	04713	MC7918CT	MC7918CT -18V 1A TO220 RE
U	2	URCO-07815	1	04713	MC7815CT	MC7815CT 1A 15V REG
VR	1	DZAD-04753	1	04713	1N4753	IN4753 36 V ZENER

Parts List for 304BA03300 COMPUTER BUS PCA Rev E

	Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	304CF03300	1	58900		COMPUTER BUS PCB
	2	ETSB-06216	15	88245	2000B	BIFURCATED TERMINAL 5/32
J	1	JPPO-20017	3	31781	345-034-524-201	34 PIN PC EDGE CONN
J	2	JPPO-20030	5	31781	345-060-524-202	60 PIN PC EDGE CONN
J	3	JPPO-20013	4	31781	345-026-524-201	26 PIN PC EDGE CONN
J	4	JSPO-10014	1	09922	DILB14P-108	14 PIN DIP SOCKET
P	1	JIA1-26730	1	52072	CAD26SP100230730	26 PIN STRIPLINE PLUG
P	2	JIA1-20430	1	52072	CAD20SP100230430	20 PIN STRIPLINE PLUG
P	3	JIA1-16630	1	52072	CAD16SP100430630	16 PIN STRIPLINE PLUG
P	4	JIA1-34730	1	52072	CAD34SP100230730	34 PIN STRIPLINE PLUG
P	5	JIA1-26730	1	52072	CAD26SP100230730	26 PIN STRIPLINE PLUG
P	6	JIA1-34730	1	52072	CAD34SP100230730	34 PIN STRIPLINE PLUG

Parts List for RF BUS PCA No. 304DA02900 Rev. E

Item		Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	304CF02900	1	58900	304CF02900	RF BUS PCB
	2	JPPG-20022	8	31781	322-044-520-258	44 PIN PC GUIDE CONN
	4	ETSB-06224	7	88245	1309B	BIFURCATED TERMINAL 15/64
	5	HBPP-44005	2	96906	MIL STD	4-40 X 5/16 PAN
	6	HNKS-44004	2	96906	MS35649-***	4-40 KEP NUT
	7	105BF12100	2	58900	105BF12100	FM DRIVER HEATSINK
	8	HQIS-01260	2	55285	XXX	TO126 INSULATOR
	9	HWFN-40400	2	96906	FW-4032	#4 NYLON WASHER
C	1	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	2	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	3	CT20-06100	1	56289	150D106X9020B2	10 UF 20V TANTALUM
C	4	CT20-06100	1	56289	150D106X9020B2	10 UF 20V TANTALUM
C	5	CT20-06100	1	56289	150D106X9020B2	10 UF 20V TANTALUM
C	6	CT20-06100	1	56289	150D106X9020B2	10 UF 20V TANTALUM
C	7	CT20-06100	1	56289	150D106X9020B2	10 UF 20V TANTALUM
C	8	CT20-06100	1	56289	150D106X9020B2	10 UF 20V TANTALUM
CR	1	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	2	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	3	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	4	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	11	DPAB-05391	1	04713	1N5391	IN5391 1.5A 35V DIODE
CR	12	DPAB-05391	1	04713	1N5391	IN5391 1.5A 35V DIODE
L	1	LAD0-05470	1	72259	WEE-4.7	4.7 UH INDUCTOR
P	1	JIA1-26730	1	52072	CAD26SP100230730	26 PIN STRIPLINE PLUG
P	2	JIA1-16630	1	52072	CAD16SP100430630	16 PIN STRIPLINE PLUG
Q	1	QBNP-06553	1	04713	2N6552	2N6552 1A 88V 10W NPN
Q	2	QBPP-06555	1	04713	MOTO 2N6555	2N6555 1A 60V 10W PNP
Q	3	QBPS-03645	1	27014	PN3645	PN3645 .5A 60V .6W PNP
Q	4	QBNS-03643	1	27014	PN3643	PN3643 .5A 30V .6W NPN
R	1	RC07-00051	1	01121	RC07GF5R1J	5.1 OHMS 5% 1/4W CARBON
R	2	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R	3	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R	4	RC07-00051	1	01121	RC07GF5R1J	5.1 OHMS 5% 1/4W CARBON
R	5	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R	6	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R	7	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
U	1	UCN0-00010	1	04713	MC14001BCP	MC14001 QUAD NOR

Parts List for 304CA05500 300 MHz OSC PCA Rev I

	Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	304CF05500	1	58900		300 MHz OSC PCB
	2	004BA00000	1	58900		SAMPLER ASSEMBLY
	3	304BF05000	1	58900		END PLATE
	4	304BF05100	1	58900		COMPONENT SIDE WALL S
	5	304BF05200	1	58900		CIRCUIT SIDE SUPPORT S
	6	304BF07200	1	58900		BASE PLATE
	7	304BF07300	2	58900		SIDE PLATE
	8	304BF07400	2	58900		CIRCUIT SIDE STRIP
	9	304CF02800	1	58900		ATTENUATOR MOUNT
	13	304BF04200	1	58900		CONNECTOR MTG. PLATE
	14	304BF08800	1	58900		COMPONENT SIDE WALL L
	15	304BF08900	1	58900		CIRCUIT SIDE SUPPORT L
	17	JRBM-00000	3	98291	51-045-0000	SMB M BULK MOUNT
	18	LFT0-83216	6	89110	859617-1	FEED-THRU FILTER 15A
AR	1	MA19-00001	1	24539	MSA-0135-12	0-250MHZ AMP 19DB 1.5DBM
AR	2	MA19-00001	1	24539	MSA-0135-12	0-250MHZ AMP 19DB 1.5DBM
AR	3	MA19-00001	1	24539	MSA-0135-12	0-250MHZ AMP 19DB 1.5DBM
AR	4	MA19-00001	1	24539	MSA-0135-12	0-250MHZ AMP 19DB 1.5DBM
AR	5	MA19-00001	1	24539	MSA-0135-12	0-250MHZ AMP 19DB 1.5DBM
AR	6	MA23-00006	1	24539	MSA-0835	0-6GHZ AMP 23DB 12.5DBM
AR	7	MA23-00006	1	24539	MSA-0835	0-6GHZ AMP 23DB 12.5DBM
C	5	CK50-03100	1	96733	SG133BX103KS	.01 UF X7R CHIP
C	6	CC50-01100	1	51642	150-100-C0G-101J	100 PF CERAMIC NPO
C	8	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	10	CK50-03100	1	96733	SG133BX103KS	.01 UF X7R CHIP
C	11	CK50-03100	1	96733	SG133BX103KS	.01 UF X7R CHIP
C	12	CK50-03100	1	96733	SG133BX103KS	.01 UF X7R CHIP
C	13	CK50-00050	1	96733	SG0805BY5R0DSA	5 PF NPO CHIP
C	14	CK50-00220	1	96733	SB93BY220JSA	22 PF NPO CHIP
C	15	CK50-00100	1	96733	SG91BY100JSA	10 PF NPO CHIP
C	16	CK50-00050	1	96733	SG0805BY5R0DSA	5 PF NPO CHIP
C	17	CT10-R7220	1	56289	199D227X9010FE2	220UF 10V 10% RADIAL LEA
C	18	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	19	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	20	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	21	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	22	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	23	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	24	CT20-07100	1	56289	150D107X0020S2	100 UF 20V TANTALUM
C	25	CC50-01220	1	51642	150-100-C0G-221	220 PF CERAMIC NPO
C	26	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	27	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	31	CC50-01220	1	51642	150-100-C0G-221	220 PF CERAMIC NPO
C	32	CK50-03100	1	96733	SG133BX103KS	.01 UF X7R CHIP
C	33	CK50-03100	1	96733	SG133BX103KS	.01 UF X7R CHIP
C	34	CK50-03100	1	96733	SG133BX103KS	.01 UF X7R CHIP
C	35	CC50-00270	1	52763	EDPT-27-NPO-5%	27 PF CERAMIC NPO
C	36	CK50-03100	1	96733	SG133BX103KS	.01 UF X7R CHIP
C	37	CC50-00270	1	52763	EDPT-27-NPO-5%	27 PF CERAMIC NPO
C	38	CK50-03100	1	96733	SG133BX103KS	.01 UF X7R CHIP

Parts List for 304CA05500 300 MHz OSC PCA Rev I

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
C 39	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C 40	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C 41	CC50-00270	1	52763	EDPT-27-NPO-5%	27 PF CERAMIC NPO
C 42	CC50-00270	1	52763	EDPT-27-NPO-5%	27 PF CERAMIC NPO
C 43	CK50-03100	1	96733	SG133BX103KS	.01 UF X7R CHIP
C 44	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C 45	CK50-03100	1	96733	SG133BX103KS	.01 UF X7R CHIP
C 46	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C 47	CC50-00270	1	52763	EDPT-27-NPO-5%	27 PF CERAMIC NPO
C 48	CC50-02470	1	51642	200-100-W5R-472K	.0047 UF CERAMIC X7R
C 49	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C 50	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C 51	CC50-00270	1	52763	EDPT-27-NPO-5%	27 PF CERAMIC NPO
C 52	CT20-06100	1	56289	150D106X9020B2	10 UF 20V TANTALUM
C 53	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C 54	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C 55	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C 56	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C 57	CK50-00050	1	96733	SG0805BY5R0DSA	5 PF NPO CHIP
C 58	CC50-00560	1	51642	150-100-C0G-560J	56 PF CERAMIC NPO
C 59	CT20-07100	1	56289	150D107X0020S2	100 UF 20V TANTALUM
CR 1	DVA0-00109	1	26629	KV3901	MV109 6-30 PF DIODE
CR 2	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR 3	DAA0-03401	1	04713	MPN3401	MPN3401 PIN DIODE
CR 4	DSA0-02810	1	28480	5082-2810	5082-2810 SCHOT. DIODE
CR 5	DSA0-02810	1	28480	5082-2810	5082-2810 SCHOT. DIODE
L 1	LR00-00000	1	58900		HAND WOUND COIL
L 2	LR00-00000	1	58900		HAND WOUND COIL
L 3	LAD0-07470	1	72259	WEE-470	470 UH INDUCTOR
L 4	LAD0-06270	1	72259	WEE-27	27 UH INDUCTOR
L 5	LAD0-06270	1	72259	WEE-27	27 UH INDUCTOR
L 6	LAD0-04150	1	72259	WEE-.15	.15 UH INDUCTOR
L 7	LAD0-05270	1	72259	WEE-2.7	2.7 UH INDUCTOR
L 8	LAD0-04150	1	72259	WEE-.15	.15 UH INDUCTOR
L 9	LAD0-05270	1	72259	WEE-2.7	2.7 UH INDUCTOR
L 10	LAD0-05270	1	72259	WEE-2.7	2.7 UH INDUCTOR
L 11	LAD0-04150	1	72259	WEE-.15	.15 UH INDUCTOR
Q 3	QBPS-02907	1	27014	PN2907	PN2907 .5A 40V .6W PNP
Q 4	QBNS-00090	1	04713	BFR90	BFR 90 15 V 5 GHZ FT
R 1	RN55-02210	1	05905	SMA 0207 E 96	221 OHMS 1% MET FILM
R 3	RN55-00100	1	05905	SMA 0207 E 96	10 OHMS 1% MET FILM
R 7	RN55-02430	1	05905	SMA 0207 E 96	243 OHMS 1% MET FILM
R 8	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 9	RN55-04750	1	05905	SMA 0207 E 96	475 OHMS 1% MET FILM
R 11	RN55-00562	1	05905	SMA 0207 E 96	56.2 OHMS 1% MET FILM
R 12	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 13	RN55-00825	1	05905	SMA 0207 E 96	82.5 OHMS 1% MET FILM
R 14	RN55-12430	1	05905	SMA 0207 E 96	2.43 K OHMS 1% MET FILM
R 15	RN55-16190	1	05905	SMA 0207 E 96	6.19 K OHMS 1% MET FILM
R 16	RN55-00511	1	05905	SMA 0207 E 96	51.1 OHMS 1% MET FILM

Parts List for 304CA05500 300 MHz OSC PCA Rev I

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
R 17	RN55-02210	1	05905	SMA 0207 E 96	221 OHMS 1% MET FILM
R 18	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 19	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R 20	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R 21	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 22	RN55-23740	1	05905	SMA 0207 E 96	37.4 K OHMS 1% MET FILM
R 23	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 24	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 25	RN55-00332	1	05905	SMA 0207 E 96	33.2 OHMS 1% MET FILM
R 26	RN55-01500	1	05905	SMA 0207 E 96	150 OHMS 1% MET FILM
R 27	RN55-00511	1	05905	SMA 0207 E 96	51.1 OHMS 1% MET FILM
R 28	RN55-02430	1	05905	SMA 0207 E 96	243 OHMS 1% MET FILM
U 1	URPO-78120	1	04713	MC78L12CP	MC78L12CP .1A 12V REG
U 2	UONO-00072	1	01295	TL072CP	TL072CP DUAL FET OP AMP
U 3	URPO-78120	1	04713	MC78L12CP	MC78L12CP .1A 12V REG
U 4	URPO-78120	1	04713	MC78L12CP	MC78L12CP .1A 12V REG
U 5	URPO-78120	1	04713	MC78L12CP	MC78L12CP .1A 12V REG

Parts List for 8 POS LEVER SWITCH PCA No. 304CA02100 Rev. D

Item		Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	304CF02100	1	58900	304CF02100	8 POS LEVER SWITCH PCB
DA	1	DSA8-02719	1	07263	FSA 2719P	FSA2719P 8 DIODES DIP
DA	2	DSA8-02719	1	07263	FSA 2719P	FSA2719P 8 DIODES DIP
DA	3	DSA8-02719	1	07263	FSA 2719P	FSA2719P 8 DIODES DIP
DA	4	DSA8-02719	1	07263	FSA 2719P	FSA2719P 8 DIODES DIP
P	1	JIA1-20430	1	52072	CAD20SP100230430	20 PIN STRIPLINE PLUG
R	1	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
R	2	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
R	3	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
R	4	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
S	1	101BC25400	1	58900	101BC25400	LEVER SWITCH-8 DIGIT
U	1	UCN0-05140	1	04713	MC14514BCP	MC14514 4 TO 16 DECODER

Parts List for FREQUENCY DISPLAY PCA No. 304CA02600 Rev. C

Item		Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	304BF02600	1	58900	304BF02600	FREQUENCY DISPLAY PCB
	2	JSP0-10018	2	09922	DILB18P-108	18 PIN DIP SOCKET
	3	HSTX-44004	2	88245	A1591B	4-40 CORNR BLOCK 1/16 MTL
	4	101BF05400	2	58900	101BF05400	DISPLAY MOUNT END
C	1	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
DS	1	IMF0-00090	1	F0001	9LT-03	9 DIGIT FLUOR DISPLAY
DS	2	ILGR-00200	1	58361	MV5253	GREEN LED .2" DIA
DS	3	ILGR-00200	1	58361	MV5253	GREEN LED .2" DIA
P	1	JIA1-26730	1	52072	CAD26SP100230730	26 PIN STRIPLINE PLUG
Q	1	QBNS-02222	1	27014	PN2222	PN2222 .5A 30V NPN
Q	2	QBNS-02222	1	27014	PN2222	PN2222 .5A 30V NPN
R	1	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R	2	RN55-03320	1	05905	SMA 0207 E 96	332 OHMS 1% MET FILM
R	3	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R	4	RN55-03320	1	05905	SMA 0207 E 96	332 OHMS 1% MET FILM
R	5	RN55-01820	1	05905	SMA 0207 E 96	182 OHMS 1% MET FILM
U	1	UIN0-00594	1	18364	NE594N	NE594 8X DISP DRIVE
U	2	UIN0-00594	1	18364	NE594N	NE594 8X DISP DRIVE
W	1	WJIB-05022	1	A0003	923345-05	.5" INSULATED JUMPER

Parts List for 5 POS LEVER SWITCH PCA No. 304BA02500 Rev. B

Item		Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	304BF02500	1	58900	304BF02500	5 POS LEVER SWITCH PC BD
DA	1	DSA8-02719	1	07263	FSA 2719P	FSA2719P 8 DIODES DIP
DA	2	DSA8-02719	1	07263	FSA 2719P	FSA2719P 8 DIODES DIP
P	1	JIA1-20430	1	52072	CAD20SP100230430	20 PIN STRIPLINE PLUG
S	1	101BC12702	1	58900	101BC12702	5 POS LEVER SWITCH +/-

Parts List for 304DA02300 MOD/PWR DISPLAY PCA Rev E

Item		Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	304CF02300	1	58900		MOD/PWR DISPLAY PCB
	2	HSTX-44004	3	88245	A1591B	4-40 CORNR BLOCK 1/16 MT
	4	JSPO-10018	4	09922	DILB18P-108	18 PIN DIP SOCKET
	5	JSPO-10016	1	09922	DILB16P-108	16 PIN DIP SOCKET
	6	JSPO-10014	1	09922	DILB14P-108	14 PIN DIP SOCKET
	7	WJIB-05022	1	A0003	923345-05	.5" INSULATED JUMPER
C	1	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	2	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
DS	1	IMFO-00050	1	F0001	5LT-03	5 DIGIT FLUOR DISPLAY
DS	2	IMFO-00050	1	F0001	5LT-03	5 DIGIT FLUOR DISPLAY
DS	3	ILGR-00200	1	58361	MV5253	GREEN LED .2" DIA
P	1	JIA1-34730	1	52072	CAD34SP100230730	34 PIN STRIPLINE PLUG
Q	1	QBNS-02222	1	27014	PN2222	PN2222 .5A 30V NPN
R	1	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R	2	RN55-03320	1	05905	SMA 0207 E 96	332 OHMS 1% MET FILM
R	3	RN55-12210	1	05905	SMA 0207 E 96	2.21 K OHMS 1% MET FILM
S	1	SLPO-00202	1	95146	CSS-022	DPDT PC MT SLIDE SWITCH
U	1	UCNO-00010	1	04713	MC14001BCP	MC14001 QUAD NOR
U	2	UINO-00594	1	18324	NE594N	NE594 8X DISP DRIVE
U	3	UCNO-05430	1	04713	MC14543P	MC14543P BCD TO 7 SEGMEN
U	4	UINO-00594	1	18324	NE594N	NE594 8X DISP DRIVE
U	5	UINO-00594	1	18324	NE594N	NE594 8X DISP DRIVE
U	6	UINO-00594	1	18324	NE594N	NE594 8X DISP DRIVE

Parts List for 304BA04600 TEMP COMP PCA Rev G

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	304BF04600	1	58900		TEMP COMP PCB
2	ETSB-06216	10	88245	2000B	BIFURCATED TERMINAL 5/32
3	HSCS-40203	3	55566	1531-A-4-A-7	#4 X 1/8 CLEAR SPACER
4	ETST-06224	1	88245	1280B	TURRET TERMINAL
C 1	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C 2	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C 3	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C 4	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C 5	CT25-R7100	1	90201	TDM107M025L6	100 UF 25V TANTALUM
CR 1	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR 2	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR 3	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
J 1	JSP0-10016	1	09922	DILB16P-108	16 PIN DIP SOCKET
P 1	JHP0-10016	1	51167	16-600-10	16 PIN DIP HEADER
Q 1	QBNS-02222	1	27014	PN2222	PN2222 .5A 30V NPN
Q 2	QBPS-02907	1	27014	PN2907	PN2907 .5A 40V .6W PNP
R 1	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 2	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 3	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R 4	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 5	RN55-13160	1	05905	SMA 0207 E 96	3.16 K OHMS 1% MET FILM
R 6	RN55-32000	1	05905	SMA 0207 E 96	200 K OHMS 1% MET FILM
R 7	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 8	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 9	RAPF-22000	1	73138	66WR20K	20K 10% 20T VERT PC
R 10	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 11	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R 12	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R 13	RN55-?????	1	05905	SMA 0207 E 96	SELECTED IN TEST
R 14	RN55-?????	1	05905	SMA 0207 E 96	SELECTED IN TEST
R 15	RN55-?????	1	05905	SMA 0207 E 96	SELECTED IN TEST
R 16	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 17	RN55-06810	1	05905	SMA 0207 E 96	681 OHMS 1% MET FILM
R 18	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
R 19	RN55-25110	1	05905	SMA 0207 E 96	51.1 K OHMS 1% MET FILM
U 1	ULP0-00335	1	27014	LM335Z	TEMP. SENS
U 2	UON0-00074	1	01295	TL074CN	TL074CN QUAD FET OP AMP
U 3	URP0-78150	1	04713	MC78L15CP	MC78L15 .1A 15V REG
U 4	URP0-79150	1	04713	MC79L15CP	MC79L15 .1A -15V REG
VR 1	DRAE-00827	1	04713	1N827	IN827 6.2V REF. DIODE

Parts List for OSCILLATOR/MULT PCA No. 304CA05700 Rev. B

Item		Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	304CF05700	1	58900	304CF05700	OSCILLATOR/MULT BD
	2	101BF04300	1	58900	101BF04300	SAMPLER IF WALL
	3	304BF06300	1	58900	304BF06300	OSCILLATOR/MULT COVER
	4	304BF06400	1	58900	304BF06400	OSCILLATOR/MULT BASE
	5	304BF06500	1	58900	304BF06500	OSCILLATOR/MULT L. SIDE
	6	304BF06600	1	58900	304BF06600	OSCILLATOR/MULT R. SIDE
	7	304BF06700	1	58900	304BF06700	OSCILLATOR/MULT END PLATE
	8	304BF06800	1	58900	304BF06800	OSCILLATOR/MULT CONN MTG
	9	LFT0-83216	4	89110	859617-1	FEED-THRU FILTER 15A
	10	JRBM-00000	6	98291	51-045-0000	SMB M BULK MOUNT
	12	101BF04601	1	58900	101BF04601	SAMPLER IF SUPPORT,NOTCHE
	13	304BF05101	1	58900	304BF05101	MODULE WALL
	14	304BF05201	1	58900	304BF05201	MODULE SUPPORT
	15	HBHS-A2403	1	96906	MIL STD	10-24 X 3/16 SET SCREW
	16	HLST-21105	1	79963	341-.093	#2 SOLDER LUG
AR	1	MA19-00001	1	24539	MSA-0135-12	0-250MHZ AMP 19DB 1.5DBM
C	1	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	2	CC50-00390	1	51642	150-100-C0G-390J	39 PF CERAMIC NPO
C	3	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	4	CV00-01012	1	18736	EF12	1-12 PF VARIABLE
C	5	CC50-00120	1	51642	150-100-C0G-120J	12 PF CERAMIC NPO
C	6	CC50-01100	1	51642	150-100-C0G-101J	100 PF CERAMIC NPO
C	7	CC50-00330	1	52763	EDPT-33-NP0-5%	33 PF CERAMIC NPO
C	8	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	9	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	10	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	11	CK50-03100	1	96733	SG133BX103KS	.01 UF X7R CHIP
C	12	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	13	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	14	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	15	CT20-06100	1	56289	150D106X9020B2	10 UF 20V TANTALUM
C	16	CT20-06100	1	56289	150D106X9020B2	10 UF 20V TANTALUM
C	17	CV00-02011	1	74970	187-0106-005	1.7-11 PF AIR TRIMMER
C	18	CV00-09035	1	59660	538011D 9-35	9-35 PF VARIABLE
C	19	CC50-00100	1	51642	100-100-C0G-100J	10 PF CERAMIC NPO
C	20	CV00-02011	1	74970	187-0106-005	1.7-11 PF AIR TRIMMER
C	21	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	22	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	23	CV00-05018	1	59660	538011A 5.5-18	5.5-18 PF VARIABLE
C	25	CV00-05018	1	59660	538011A 5.5-18	5.5-18 PF VARIABLE
C	26	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	27	CV00-05018	1	59660	538011A 5.5-18	5.5-18 PF VARIABLE
C	28	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	29	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	30	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	31	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	33	CC50-01100	1	51642	150-100-C0G-101J	100 PF CERAMIC NPO
CR	1	DSA0-02810	1	28480	5082-2810	5082-2810 SCHOT. DIODE
CR	2	DVA0-00109	1	04713	MV109	MV109 6-30 PF DIODE
CR	3	DVA0-00109	1	04713	MV109	MV109 6-30 PF DIODE
L	1	LAD0-05270	1	72259	WEE-2.7	2.7 UH INDUCTOR

Parts List for OSCILLATOR/MULT PCA No. 304CA05700 Rev. B

Item		Part Number	Qty	FSCM	Mfr's Part Number	Description
L	2	LAD0-04150	1	72259	WEE-.15	.15 UH INDUCTOR
L	3	LR00-00000	1	58900		HAND WOUND COIL
L	4	LR00-00000	1	58900		HAND WOUND COIL
L	5	LR00-00000	1	58900		HAND WOUND COIL
L	6	LAD0-04150	1	72259	WEE-.15	.15 UH INDUCTOR
L	7	LR00-00000	1	58900		HAND WOUND COIL
L	8	LR00-00000	1	58900		HAND WOUND COIL
Q	1	QBNS-06304	1	04713	2N6304	2N6304 15V 1400MHZ NPN
R	1	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R	2	RN55-14750	1	05905	SMA 0207 E 96	4.75 K OHMS 1% MET FILM
R	3	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R	4	RN55-05620	1	05905	SMA 0207 E 96	562 OHMS 1% MET FILM
R	5	RN55-00562	1	05905	SMA 0207 E 96	56.2 OHMS 1% MET FILM
R	6	RN55-05620	1	05905	SMA 0207 E 96	562 OHMS 1% MET FILM
R	7	RN55-05620	1	05905	SMA 0207 E 96	562 OHMS 1% MET FILM
R	8	RN55-03320	1	05905	SMA 0207 E 96	332 OHMS 1% MET FILM
R	9	RN55-03320	1	05905	SMA 0207 E 96	332 OHMS 1% MET FILM
R	10	RN55-03320	1	05905	SMA 0207 E 96	332 OHMS 1% MET FILM
R	11	RN55-05620	1	05905	SMA 0207 E 96	562 OHMS 1% MET FILM
R	12	RN55-08250	1	05905	SMA 0207 E 96	825 OHMS 1% MET FILM
R	13	RN55-08250	1	05905	SMA 0207 E 96	825 OHMS 1% MET FILM
R	14	RN55-08250	1	05905	SMA 0207 E 96	825 OHMS 1% MET FILM
R	15	RN55-03320	1	05905	SMA 0207 E 96	332 OHMS 1% MET FILM
R	16	RN55-03320	1	05905	SMA 0207 E 96	332 OHMS 1% MET FILM
R	17	RN55-03320	1	05905	SMA 0207 E 96	332 OHMS 1% MET FILM
R	18	RN55-03320	1	05905	SMA 0207 E 96	332 OHMS 1% MET FILM
R	20	RN55-03320	1	05905	SMA 0207 E 96	332 OHMS 1% MET FILM
R	21	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
U	1	UEN0-10216	1	04713	MC10216P	MC10216P TRIPLE RCVR
U	2	UEN1-10107	1	04713	MC10H107P	MC10H107P TRI OR/NOR
U	3	URP0-78120	1	04713	MC78L12CP	MC78L12CP .1A 12V REG
U	4	URC0-07815	1	04713	MC7815CT	MC7815CT 1A 15V REG
U	5	UEN0-10216	1	04713	MC10216P	MC10216P TRIPLE RCVR
U	6	UEN0-10216	1	04713	MC10216P	MC10216P TRIPLE RCVR
Y	1	Y180-11000	1	00809	C189-1	110MHZ 5TH OVTN XTAL
YH	1	Y18H-00150	1	12020	PCL1-43-15-60	15V HC18 XTAL OVEN

Parts List for EXT ALC POT/SW M600 PCA No. 304BA09000 Rev. C

Item		Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	304BF09000	1	58900	304BF09000	EXT ALC POT/SW M600 PCB
	2	ETSB-06216	8	88245	2000B	BIFURCATED TERMINAL 5/32
	3	STWO-00102	1	09353	7101-P4-D	SPDT TOGGLE SWITCH
R	1	RAPF-15000	1	73138	66WR5K	5K 10% 20T VERT PC
R	2	RAPF-22000	1	73138	66WR20K	20K 10% 20T VERT PC
R	3	RN56-21000	1	60393	GP 1/4 TC 25	10.0 K OHMS 1% MET FILM

Parts List for MODULATION CONTROL PCA No. 308DA00301 Rev. I

Item		Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	308CF00301	1	58900	308CF00301	MODULATION CONTROL PCB
	2	ETSB-06216	10	88245	2000B	BIFURCATED TERMINAL 5/32
C	1	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	2	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	3	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	4	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	5	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	6	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	7	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	8	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	9	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	10	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	11	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	12	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	15	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	16	CC50-03470	1	51642	150-100-W5R-473	.047 UF CERAMIC X7R
C	17	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	18	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	19	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	20	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	21	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	22	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	23	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	24	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	25	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	26	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
CR	1	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	2	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	3	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	4	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	5	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	6	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	7	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	8	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	9	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	10	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	11	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	12	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	13	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	14	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	15	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	16	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
J	1	JRBM-00101	1	98291	51-053-0000	SMB M RTANG PC MOUNT
J	2	JRBM-00101	1	98291	51-053-0000	SMB M RTANG PC MOUNT
J	3	JRBM-00101	1	98291	51-053-0000	SMB M RTANG PC MOUNT
J	6	JRBM-00101	1	98291	51-053-0000	SMB M RTANG PC MOUNT
P	2	JIA1-16630	1	52072	CAD16SP100430630	16 PIN STRIPLINE PLUG
P	3	JIA1-26730	1	52072	CAD26SP100230730	26 PIN STRIPLINE PLUG
Q	1	QBNS-04275	1	27014	PN4275	PN4275 .1A 15V .6W NPN
Q	2	QBPS-02907	1	27014	PN2907	PN2907 .5A 40V .6W PNP
Q	3	QBPS-02907	1	27014	PN2907	PN2907 .5A 40V .6W PNP

Parts List for MODULATION CONTROL PCA No. 308DA00301 Rev. I

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
Q 4	QBNS-04275	1	27014	PN4275	PN4275 .1A 15V .6W NPN
Q 5	QBPS-02907	1	27014	PN2907	PN2907 .5A 40V .6W PNP
Q 6	QBPS-02907	1	27014	PN2907	PN2907 .5A 40V .6W PNP
Q 7	QBNS-04275	1	27014	PN4275	PN4275 .1A 15V .6W NPN
Q 8	QBPS-02907	1	27014	PN2907	PN2907 .5A 40V .6W PNP
Q 9	QBPS-02907	1	27014	PN2907	PN2907 .5A 40V .6W PNP
Q 10	QBPS-04258	1	27014	PN4258	PN4258 12V 700MHZ PNP
Q 11	QBNS-04275	1	27014	PN4275	PN4275 .1A 15V .6W NPN
Q 12	QBNS-04275	1	27014	PN4275	PN4275 .1A 15V .6W NPN
Q 14	QBNS-02222	1	27014	PN2222	PN2222 .5A 30V NPN
R 1	RN55-01500	1	05905	SMA 0207 E 96	150 OHMS 1% MET FILM
R 2	RN55-03320	1	05905	SMA 0207 E 96	332 OHMS 1% MET FILM
R 3	WJIB-05022	1	A0003	923345-05	.5" INSULATED JUMPER
R 4	RN55-01500	1	05905	SMA 0207 E 96	150 OHMS 1% MET FILM
R 5	RN55-03320	1	05905	SMA 0207 E 96	332 OHMS 1% MET FILM
R 6	WJIB-05022	1	A0003	923345-05	.5" INSULATED JUMPER
R 7	RN55-01500	1	05905	SMA 0207 E 96	150 OHMS 1% MET FILM
R 8	RN55-03320	1	05905	SMA 0207 E 96	332 OHMS 1% MET FILM
R 9	WJIB-05022	1	A0003	923345-05	.5" INSULATED JUMPER
R 10	RN55-06650	1	05905	SMA 0207 E 96	665 OHMS 1% MET FILM
R 11	RN55-01210	1	05905	SMA 0207 E 96	121 OHMS 1% MET FILM
R 12	RN55-06650	1	05905	SMA 0207 E 96	665 OHMS 1% MET FILM
R 13	RN55-01210	1	05905	SMA 0207 E 96	121 OHMS 1% MET FILM
R 14	RN55-06650	1	05905	SMA 0207 E 96	665 OHMS 1% MET FILM
R 15	RN55-01210	1	05905	SMA 0207 E 96	121 OHMS 1% MET FILM
R 16	RN55-03320	1	05905	SMA 0207 E 96	332 OHMS 1% MET FILM
R 17	RN55-04750	1	05905	SMA 0207 E 96	475 OHMS 1% MET FILM
R 18	RN55-00182	1	05905	SMA 0207 E 96	18.2 OHMS 1% MET FILM
R 19	RAPD-11000	1	73138	89PR1K	1K POT 15T PC MNT
R 20	RAPD-31000	1	73138	89PR100K	100K POT 15T PC MNT
R 21	RAPD-31000	1	73138	89PR100K	100K POT 15T PC MNT
R 22	RN55-15620	1	05905	SMA 0207 E 96	5.62 K OHMS 1% MET FILM
R 23	RN55-15620	1	05905	SMA 0207 E 96	5.62 K OHMS 1% MET FILM
R 24	RC05-05600	1	01121	RC05GF561-J	560 OHM 5% 1/8W CARBON
R 25	RC05-11000	1	01121	BB-102-5	1.0K; 5% 1/8W CARBON
R 26	RC05-06800	1	01121	BB-681-5	680ohm; 5% 1/8W CARBON
R 27	RC05-01000	1	01121	BB-101-5	100ohms;5% 1/8W CARBON
R 28	RC05-03300	1	01121	BB-331-5	330ohms 5% 1/8W CARBON
R 29	RN55-11500	1	05905	SMA 0207 E 96	1.5 K OHMS 1% MET FILM
R 30	RN55-21500	1	05905	SMA 0207 E 96	15 K OHMS 1% MET FILM
R 31	RN55-28250	1	05905	SMA 0207 E 96	82.5 K OHMS 1% MET FILM
R 32	RN55-22550	1	05905	SMA 0207 E 96	25.5 K OHMS 1% MET FILM
R 33	RAPD-15000	1	73138	89PR5K	5K POT 15T PC MNT
R 34	RN55-14990	1	05905	SMA 0207 E 96	4.99 K OHMS 1% MET FILM
R 35	RAPD-15000	1	73138	89PR5K	5K POT 15T PC MNT
R 36	RAPD-15000	1	73138	89PR5K	5K POT 15T PC MNT
R 37	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R 38	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R 39	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 40	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R 41	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM

Parts List for MODULATION CONTROL PCA No. 308DA00301 Rev. I

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
R 42	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R 43	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R 44	RN55-00511	1	05905	SMA 0207 E 96	51.1 OHMS 1% MET FILM
R 45	RN55-06040	1	05905	SMA 0207 E 96	604 OHMS 1% MET FILM
R 46	RN55-02210	1	05905	SMA 0207 E 96	221 OHMS 1% MET FILM
R 47	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 48	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 49	RN55-05620	1	05905	SMA 0207 E 96	562 OHMS 1% MET FILM
R 51	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 53	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 54	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 55	RAPA-15000	1	01121	SPPN116P502U	5K 375W X 1.16
R 56	RAPA-15000	1	01121	SPPN116P502U	5K 375W X 1.16
R 57	RC05-11000	1	01121	BB-102-5	1.0K; 5% 1/8W CARBON
R 59	RC05-34700	1	01121	BB-474-5	470 K 5% 1/8W CARBON
R 60	RC05-34700	1	01121	BB-474-5	470 K 5% 1/8W CARBON
R 61	RC05-21000	1	01121	BB-103-5	10K; 5% 1/8W CARBON
R 62	RN55-03320	1	05905	SMA 0207 E 96	332 OHMS 1% MET FILM
R 63	RN55-03320	1	05905	SMA 0207 E 96	332 OHMS 1% MET FILM
R 64	RN55-03320	1	05905	SMA 0207 E 96	332 OHMS 1% MET FILM
R 66	RC05-21000	1	01121	BB-103-5	10K; 5% 1/8W CARBON
R 107	RN55-?????	1	05905	SMA 0207 E 96	SELECTED IN TEST
R 108	RN55-?????	1	05905	SMA 0207 E 96	SELECTED IN TEST
R 109	RN55-?????	1	05905	SMA 0207 E 96	SELECTED IN TEST
RM 1	RM7S-05600	1	71450	750-81-R560	560 OHM X 7 SIP NETWRK
RM 2	RM7S-12200	1	71450	750-81-R2.2K	2.2KOHM X 7 SIP NETWRK
S 1	SFPO-00102	1	09353	7103-J2-V8	ROCKER SWITCH
S 2	SFPO-00102	1	09353	7103-J2-V8	ROCKER SWITCH
S 3	SFPO-00102	1	09353	7103-J2-V8	ROCKER SWITCH
U 1	UENO-10105	1	04713	MC10105P	MC10105P TRIPLE OR/NOR
U 2	UINO-01413	1	04713	MC1413P	MC1413P X7 DRIVER .5A
U 3	UENO-10105	1	04713	MC10105P	MC10105P TRIPLE OR/NOR
U 4	UONO-00072	1	01295	TL072CP	TL072CP DUAL FET OP AMP
U 5	URPO-78150	1	04713	MC78L15CP	MC78L15 .1A 15V REG
U 6	URPO-79150	1	04713	MC79L15CP	MC79L15 .1A -15V REG
U 7	UGNO-08038	1	32293	ICL 8038 CC JD	ICL8038 WAVEFORM GEN.
U 8	UCNO-05550	1	04713	MC14555BCP	MC14555BCP DUAL 1 OF 4
U 9	UTNO-01381	1	01295	SN74LS138N	SN74LS138N 3 TO 8 DEC
U 10	UCNO-00010	1	04713	MC14001BCP	MC14001 QUAD NOR
U 11	ULNO-05053	1	32293	IH5053CJE	IH5053 QUAD ANALOG SWITCH
U 12	UTNO-02372	1	04713	74HC237N	74HC237N 1 OF 8 DECODER
U 13	UCNO-00760	1	04713	MC14076BCP	MC14076BCP 4 BIT LATCH
U 14	UCNO-00760	1	04713	MC14076BCP	MC14076BCP 4 BIT LATCH
U 15	UTNO-01752	1	04713	74HC175N	74HC175N QUAD D FLIP-FLOP
U 16	ULNO-05053	1	32293	IH5053CJE	IH5053 QUAD ANALOG SWITCH
U 17	UONO-00072	1	01295	TL072CP	TL072CP DUAL FET OP AMP

Parts List for M600 DWNCONV. PLL PCA No. 304CA11600 Rev. E

Item		Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	304CF11600	1	58900	304CF11600	M600 DWNCONV. PLL PCB
	2	ETSB-06216	15	88245	2000B	BIFURCATED TERMINAL 5/32
	3	ETST-06224	1	88245	1280B	TURRET TERMINAL
C	1	CT10-06390	1	56289	150D396X9010B2	39 UF 10V TANTALUM
C	2	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	3	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	4	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	5	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	6	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	7	CT20-06100	1	56289	150D106X9020B2	10 UF 20V TANTALUM
C	8	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	9	CC50-02150	1	51642	200-050-NP0-152J	1500PF CERAMIC NP0
C	10	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	11	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	12	CC50-02150	1	51642	200-050-NP0-152J	1500PF CERAMIC NP0
C	13	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	14	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	15	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	16	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	17	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	18	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	19	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	20	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	21	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	22	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	23	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	24	CE63-07220	1	56289	501D227F063PR	220 UF 63V ELECT.
CR	1	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	2	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	3	DSA0-00300	1	07263	FDH300	FDH300 LOW LEAK DIODE
CR	4	DSA0-00300	1	07263	FDH300	FDH300 LOW LEAK DIODE
CR	5	DSA0-00300	1	07263	FDH300	FDH300 LOW LEAK DIODE
CR	6	DSA0-00300	1	07263	FDH300	FDH300 LOW LEAK DIODE
CR	7	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	8	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	9	DZAD-04753	1	04713	1N4753	IN4753 36 V ZENER
CR	10	DPAB-05391	1	04713	1N5391	IN5391 1.5A 35V DIODE
CR	11	DPAB-05391	1	04713	1N5391	IN5391 1.5A 35V DIODE
CR	12	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	13	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
DS	1	ILRR-00125	1	58361	MV5077C	RED LED 1/8" DIA
J	1	JRBM-00101	1	98291	51-053-0000	SMB M RTANG PC MOUNT
J	2	JRBM-00101	1	98291	51-053-0000	SMB M RTANG PC MOUNT
J	3	JRBM-00101	1	98291	51-053-0000	SMB M RTANG PC MOUNT
Q	1	QBNS-02222	1	27014	PN2222	PN2222 .5A 30V NPN
Q	2	QBPS-02907	1	27014	PN2907	PN2907 .5A 40V .6W PNP
Q	3	QBPP-05193	1	04713	2N5193	2N5193 4A 40V 40W PNP
R	1	RN55-00681	1	05905	SMA 0207 E 96	68.1 OHMS 1% MET FILM
R	2	RN55-02210	1	05905	SMA 0207 E 96	221 OHMS 1% MET FILM
R	3	RN55-01300	1	05905	SMA 0207 E 96	130 OHMS 1% MET FILM
R	4	RN55-00825	1	05905	SMA 0207 E 96	82.5 OHMS 1% MET FILM

Parts List for M600 DWNCONV. PLL PCA No. 304CA11600 Rev. E

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
R 5	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 6	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 7	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 8	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 9	RN55-13010	1	05905	SMA 0207 E 96	3.01 K OHMS 1% MET FILM
R 10	RN55-13010	1	05905	SMA 0207 E 96	3.01 K OHMS 1% MET FILM
R 11	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 12	RN55-05620	1	05905	SMA 0207 E 96	562 OHMS 1% MET FILM
R 13	RN55-21150	1	05905	SMA 0207 E 96	11.5 K OHMS 1% MET FILM
R 14	RN55-05620	1	05905	SMA 0207 E 96	562 OHMS 1% MET FILM
R 15	RN55-21150	1	05905	SMA 0207 E 96	11.5 K OHMS 1% MET FILM
R 16	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R 17	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 18	RN55-12740	1	05905	SMA 0207 E 96	2.74 K OHMS 1% MET FILM
R 19	RN55-22490	1	05905	SMA 0207 E 96	24.9 K OHMS 1% MET FILM
R 20	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R 21	RN55-22490	1	05905	SMA 0207 E 96	24.9 K OHMS 1% MET FILM
R 22	RN55-24750	1	05905	SMA 0207 E 96	47.5 K OHMS 1% MET FILM
R 23	RN55-31500	1	05905	SMA 0207 E 96	150 K OHMS 1% MET FILM
R 24	RN55-31500	1	05905	SMA 0207 E 96	150 K OHMS 1% MET FILM
R 25	RN55-31000	1	05905	SMA 0207 E 96	100 K OHMS 1% MET FILM
R 26	RN55-41000	1	05905	SMA 0207 E 96	1 M OHMS 1% MET FILM
R 27	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 28	RN55-04750	1	05905	SMA 0207 E 96	475 OHMS 1% MET FILM
R 29	RAPF-22000	1	73138	66WR20K	20K 10% 20T VERT PC
R 30	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 31	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 32	RN55-22800	1	05905	SMA 0207 E 96	28 K OHMS 1% MET FILM
R 33	RN55-21500	1	05905	SMA 0207 E 96	15 K OHMS 1% MET FILM
R 34	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 35	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 36	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 37	RN55-03920	1	05905	SMA 0207 E 96	392 OHMS 1% MET FILM
R 38	RN55-03920	1	05905	SMA 0207 E 96	392 OHMS 1% MET FILM
R 39	RN55-11000	1	05905	SMA 0207 E 96	1 K OHMS 1% MET FILM
R 40	RN55-01000	1	05905	SMA 0207 E 96	100 OHMS 1% MET FILM
R 41	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 42	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
R 43	RN55-21000	1	05905	SMA 0207 E 96	10 K OHMS 1% MET FILM
U 1	UENO-12040	1	04713	MC12040P	MC12040P PHASE/FREQ DET
U 2	UONO-00072	1	01295	TL072CP	TL072CP DUAL FET OP AMP
U 3	UONO-00072	1	01295	TL072CP	TL072CP DUAL FET OP AMP
U 4	UONO-00072	1	01295	TL072CP	TL072CP DUAL FET OP AMP
U 5	UONO-05532	1	18324	NE5532N	DUAL;OP AMP;10MHz
U 6	UONO-05532	1	18324	NE5532N	DUAL;OP AMP;10MHz
VR 1	DRAE-00827	1	04713	1N827	IN827 6.2V REF. DIODE

LIST OF MANUFACTURERS

The names and addresses of manufacturers cited in the preceding parts lists are shown on the following pages. Each manufacturer is listed under its FSCM number (Federal Supply Code for Manufacturers), as noted in the parts lists. In a few cases, no FSCM number has been assigned; these manufacturers are referenced by alphanumeric codes (e.g., 'F0001') shown at the end of the list.

FSCM	NAME & ADDRESS		ZIP CODE
00750	Air Track Mfg Corp	College Park MD	N/A
00809	Croven Crystals 500 Beech Street	Whitby, Ontario, Canada	L1N5S5
01121	Allen-Bradley Co 1201 South 2nd Street	Milwaukee, WI	53204
01295	Texas Instruments, Inc 13500 N Cntrl Expressway	Dallas, TX	75265
01963	Cherry Electrical Products 3600 Sunset Ave	Waukegan, IL	60087
02091	Wolf Co	Chambersburg, PA	N/A
02660	Bunker Ramo-Eltra Corp 2801 So 25th Ave	Broadview, IL	60153
02735	RCA Corp Route 202	Somerville, NJ	08876
03614	Bussman Mfg 114 Old State Rd P.O.Box 144	St Louis MO	63178
04173	Houston Fearless Corp	New York,NY	N/A
04552	Grace W R and Co 869 Washington Street	Canton, MA	02021
04713	Motorola Inc 5005 E Mcdowell Rd	Phoenix, AZ	85008
05236	Jonathan Manufacturing Corp 1101 S Acacia Ave	Fullerton, CA	92631
05245	Corcom Inc 1600 Winchester Rd	Libertyville, IL	60048
05791	Lyn-Tron Inc 3150 Damon Way	Burbank CA	91505
05820	EG and G Wakefield Engineering 60 Audubon Rd	Wakefield MA	01880
05905	Jerobee Industries Inc	Redmond WA	N/A
06049	Topaz Inc 9192 Topaz Way	San Diego CA	92123

FSCM	NAME & ADDRESS		ZIP CODE
06349	Cam-Lok Div Empire Products In 10540 Chester Rd	Cincinatti OH	45215
06383	Panduit Corp 17301 Ridgeland	Tinley Park IL	60477
06540	Mite Corp 446 Blake St	New Haven CT	06515
06776	Robinson Nugent Inc 800 E 8th St	New Albany IN	47150
07263	Fairchild Camera & Instrument 464 Ellis St	Mountain View CA	94039
07512	Oak Materials Group Inc McCaffrey St	Hoosick Falls NY	12090
07556	Calabro Industries Inc 1372 Enterprise Dr	West Chester PA	19380
09022	Cornell-Dubilier Electric Corp 1605 Rodney French Blvd	New Bedford MA	93790
09353	C and K Components Inc 15 Riverdale Ave	Newton MA	02158
09922	Burndy Corp Richards Ave	Norwalk CT	06856
11532	Teledyne Relays 12525 Daphne Ave	Hawthorne CA	90250
11769	Elco/Dyntech Div of Elco Corp 1225 E Wakeham Ave	Santa Ana CA	92702
12020	Ovenaire Div of Electronic Tec 706 Forrest St	Charlottesville VA	22901
13103	Thermalloy Co Inc 2021 W Valley View Lane	Dallas TX	75381
13708	Allied Components N/A	Inglewood CA	N/A
13919	Burr-Brown Research Corp 6730 S Tucson Blvd	Tucson AZ	85734
14482	Watkins-Johnson Co 3333 Hillview Ave	Palo Alto CA	94304
14604	Elmwood Sensors Inc 500 Narragansett Park Dr	Pawtucket RI	02861

FSCM	NAME & ADDRESS		ZIP CODE
14831	MCI Electronics Inc	Van Nuys CA	07088
15286	RHG Electronics Laboratory Inc 161 E Industry Ct	Deer Park NY	11729
15542	Mini-Circuits Laboratory 2625 E 14th St	Brooklyn NY	11235
15915	Tepro of Florida Inc 2608 Enterprise Rd	Clearwater FL	33517
16179	M/A-Com Omni Spectra Inc 21 Continental Blvd	Merrimack NH	03054
16428	Cooper Belden Electronic Wire NW N St	Richmond IN	47374
16733	Cablewave Systems Inc 60 Dodge Ave	North Haven CT	06473
17217	Gore W L and Associates Inc 555 Paper Mill Rd	Newark DE	19714
17540	Alpha Industries Inc 20 Sylvan Rd	Woburn MA	01801
17856	Siliconix Inc 2201 Laurelwood Rd	Santa Clara CA	95054
18310	Concord Electronics Corp 30 Great Jones St	New York NY	10012
18324	Signetics Corp 4130 S Market Court	Sacramento CA	95834
18364	Mag-Tool Co 940 American St	San Carlos CA	94070
18714	RCA Corp Findlay Plant 1700 Fostoria Rd	Findlay OH	45840
18736	Voltronics Corp West St	East Hanover NJ	07936
19089	Swimrite Mfg Co Inc	Van Nuys CA	N/A
19701	Mepco/Electra Inc P.O. Box 760	Mineral Wells TX	76067
20550	Engineering Mfg Co	Sheboygan WI	N/A

FSCM	NAME & ADDRESS		ZIP CODE
20944	Wiltron Co 805 E Middlefield Rd	Mountain View CA	94042
20999	Minnesota Mining and Mfg Co 3M Center	St Paul MN	55101
21604	Buckeye Stamping Co 555 Marion Rd	Columbus OH	43207
21847	TRW Microwave Inc 825 Stewart Dr	Sunnyvale CA	94086
23936	Pamotor 770 Airport Blvd	Burlingame CA	94010
24355	Analog Devices Inc Rt 1 Industrial Park	Norwood MA	02062
24539	Avantek Inc 3175 Bowers Ave	Santa Clara CA	95051
24995	Environmental Container System 3560 Rogue River Hwy	Grants Pass OR	97526
26923	Control Master Products Inc 1062 Shary Circle	Concord CA	94518
27014	National Semiconductor Corp 2900 Semiconductor Dr	Santa Clara CA	95051
27851	Film Microelectronics 17 A St	Burlington MA	01803
28480	Hewlett Packard Co 3000 Hanover St	Palo Alto CA	94304
29005	Storm Products Co 112 S Glasglow Ave	Inglewood CA	90301
29111	Trak Microwave Corp 735 Palomar Ave	Sunnyvale CA	94086
29990	American Technical Ceramics One Norden Lane	Huntington Station NY	11746
31433	Union Carbide Corp Hwy 276 SE	Greenville SC	29606
31703	Gudrun Frederiksen Co.	Oakland CA	N/A
31781	Edac Inc 20 Railside Rd	Don Mills Ont Can	M3A1A4

FSCM	NAME & ADDRESS		ZIP CODE
31918	ITT Schadow Inc 8081 Wallace Rd	Eden Prarie MN	55344
32293	Intersil Inc 10600 Ridgeview Ct	Cupertino CA	95014
32559	Bivar Inc 4 Thomas St	Irvine CA	92718
32767	Griffith Plastics Corp 1027 California Dr	Burlingame CA	94010
32997	Bourns Inc Trimpot Div 1200 Columbia Ave	Riverside CA	92507
33191	Drew Chemical Ltd 1 Drew Ct	Ajax Ont Can	L1S2E5
34031	Analog Devices Inc 7810 Success Rd	Greensboro NC	27409
34078	Midwest Microwave Inc 3800 Packard Rd	Ann Arbor MI	48104
34576	Rockwell International Corp 4311 Jamboree Rd	Newport Beach CA	92660
34785	Dek Inc 3480 Swenson Ave	St Charles IL	60174
50721	General Electric 11 Cabot Blvd	Mansfield MA	02048
51167	Aries Electronics Inc 62 Trenton Ave	Frenchtown NJ	08825
51284	Mos Technology Inc 950 Rittenhouse Rd	Norristown PA	19401
51642	Center Engineering Co 2820 E College Ave	State College PA	16801
51705	Icco Rally 2575 E.Bayshore Rd	Palo Alto,CA	94303
52072	Circuit Assembly Corp 18 Thomas St	Irvine CA	92714
52648	Plessey Trading Corp 1641 Kaiser Ave	Irvine CA	92714
52683	Baytron Co Inc 344 Salem St	Medford MA	02155

FSCM	NAME & ADDRESS		ZIP CODE
52763	Stettner Electronics Inc 6135 Airways Blvd	Chattanooga TN	37421
52840	Western Digital Corp 3128 Red Hill Ave	Costa Mesa CA	92626
54186	Micro Power Systems Inc 3100 Alfred St	Santa Clara CA	95050
54343	Riedel M W and Co 300 Cypress Ave	Alhambra CA	91801
54487	Micronetics Inc 36 Oak St	Norwood NJ	07648
55153	Dielectric Laboratories Inc 69 Albany St	Cazenovia NY	13035
55261	LSI Computer Systems Inc 1235 Walt Whitman Rd	Melville NY	11747
55285	Bergquist Co Inc 5300 Edina Industrial Blvd	Minneapolis MN	55435
55387	Pamtech 8030 Remmet Ave.	Canoga Park CA	91304
55566	R A F Electronic Hardware 95 Silvermine Rd	Seymour CT	06483
55576	Synertek 3001 Stender Way	Santa Clara CA	95051
56289	Sprague Electric Co 87 Marshall St	North Adams MA	01247
56563	Alatec Products 12747 Saticoy St	North Hollywood CA	91605
57793	United Microwave Products Inc 185 W 205th St	Torrance CA	90503
58202	Innowave Inc 15555 Concord Circle	Morgan Hill CA	95037
58361	General Instrument Corp 3400 Hillview Ave	Palo Alto CA	94304
58900	Giga-Tronics Inc 2495 Estand Way	Pleasant Hill CA	94523
59660	Tusonix Inc. 2155 N Forbes Blvd Suite 107	Tuson AZ	85745

FSCM	NAME & ADDRESS		ZIP CODE
60393	Precision Resistive Products I 655 Main St	Mediapolis IA	52637
60450	Microwave Components Inc 7 Meehan Dr	Chelmsford MA	01824
60644	CSDC P.O. Box 2116	Wayne NJ	07470
61104	Aris Engineering Corp 30 Bond St	Haverhill MA	01830
61485	Hitachi Denshi America Ltd 175 Crossways Park W	Woodbury NY	11797
61802	Toshiba Internatioal 13131 W Little York Rd	Houston TX	77041
62331	Krytar Inc 1292 Anvilwood Court	Sunnyvale CA	94086
63132	Time Microwave 398 Martin Ave	Santa Clara CA	95050
63468	Electro Dynamics 5625 Foxridge Dr	Shawnee Mission KS	66201
63542	Hall-Mark Electronics Corp 11333 Pagemill Rd	Dallas TX	75222
64671	Inmet Corp 7155 Jackson Rd	Ann Arbor MI	48103
65032	Rogers Corp Williams Fld & Dobson Rd	Chandler AZ	85224
65517	Ayer Engineering Co 1250 W Roger Rd	Tucson AZ	85705
66148	Fairlane Fluid/Airproducts 23435 Industrial Pk Dr	Farmington MI	48024
66466	Standard Instrumentation Inc 3322 Pennsylvania Ave	Charlston WV	25302
70903	Belden Corp 200 S Batavia Ave	Geneva IL	60134
71450	CTS Corp 905 N West Blvd	Elkhart IN	46514
71468	ITT Cannon Electric 10550 Talbert Ave	Fountain Valley CA	92708

FSCM	NAME & ADDRESS		ZIP CODE
71785	TRW Inc 1501 Morse Ave	Elk Grove Village IL	60104
72259	Nytronics Inc 475 Park Ave S	New York NY	10016
72982	Murata Erie North America Inc 645 W 11th St	Erie PA	16512
73138	Beckman Industrial Corp 2500 Harbor Ave	Fullerton CA	92634
74970	Johnson E F Co 299 10th Ave S W	Waseca MN	56093
75263	Keystone Carbon Co 1935 State St	St Marys PA	15857
75378	CTS Knights Inc 400 Reimann Ave	Sandwich IL	60548
75915	Tracor Littlefuse Inc 800 E Northwest HWY	Des Plains IL	60016
78553	Eaton Corp 8700 Brookpark Rd	Cleveland OH	44101
79963	Zierick Mfg Co Radio Circke	Mt Kisko NY	10549
81073	Grayhill Inc 561 Hillgrove Ave	La Grange IL	60525
81312	Winchester Electronics 400 Park Rd	Watertown CT	06795
81703	Mulberry Metal Products Inc 2199 Stanley Terrace	Union NJ	07083
81774	Carol Wire and Cable Corp 249 Roosevelt Ave	Pawtucket RI	02860
82152	Transco Products Inc 4241 Glenco Ave	Marina Del Ray CA	90295
82199	Polarad Electronics Inc 5 Delaware Dr	Lake Success NY	11042
82877	Rotron Inc 7 Hasbrouck Ln	Woodstock NY	12498
83330	Kulka Smith Inc 1913 Atlantic Ave	Manasquan NJ	08736

FSCM	NAME & ADDRESS		ZIP CODE
84084	American Iron and Machine Work	Oklahoma City OK	N/A
86797	Rogan Corp 3455 Woodhead Dr	Northbrook IL	60062
88245	Winchester Electronics 13536 Saticoy St	Van Nuys CA	91409
89110	Amp Inc 1595 S Mt Joy St	Elizabethtown PA	17022
90201	Mallory Capacitor Co 4760 Kentucky Ave	Indianapolis IN	46206
91506	Augat Inc 33 Sperry Ave	Attleboro MA	02703
91637	Dale Electronics Inc 2064 12th Ave	Columbus NE	68601
91662	Elco Corp Industrial Park	Huntington PA	16652
92194	Alpha Wire Corp 711 Lidgerwood Ave	Elizabeth NJ	07207
93459	Weinschel Engineering Co 1 Weinschel Lane	Gaithersburg MD	20877
95077	Solitron Devices Inc Cove Rd	Port Salerno FL	33492
95146	Alco Electronic Products Inc 1551 Osgood St	North Andover MA	01845
95348	Gordos Corp 250 Glenwood Ave	Bloomfield NJ	07003
95987	Weckesser Co Inc 727 W Glendale Ave	Milwaukee WI	53209
96341	Microwave Assoc Inc N.W. Iustrial Park So A	Burlington MA	01803
96733	San Fernando Electric Mfg Co 1501 First St	San Fernando CA	91341
96906	Mil Standard		N/A
98291	Sealectro Corp 40 Lindeman Dr	Trumbull CT	06611

FSCM	NAME & ADDRESS		ZIP CODE
99800	American Precision Industries 270 Quaker Rd	East Aurora NY	14052
F0001	Futaba Corp of America 555 W Victoria St	Compton CA	90220
G0001	Greenwich Instruments Ltd 3401 Monroe Rd C/O LMS Elec.	Charlotte NC	28205
H0002	Herotek Inc 265 J Sobrante Way	Sunnyvale CA	94086
I0002	ITW Switches 6615 West Irving Park Rd	Chicago IL	60634
M0004	Microplastics 9180 Gazette Ave	Chatsworth CA	91311
M0007	Mitsubishi Electronics Inc 1050 E Arques Ave	Sunnyvale CA	94086
P0004	Pacific Millimeter 189 Linbrook Dr	San Diego CA	92111
V0002	Virtech 805 G University Ave	Los Gatos CA	95030

SECTION SEVEN

DIAGRAMS

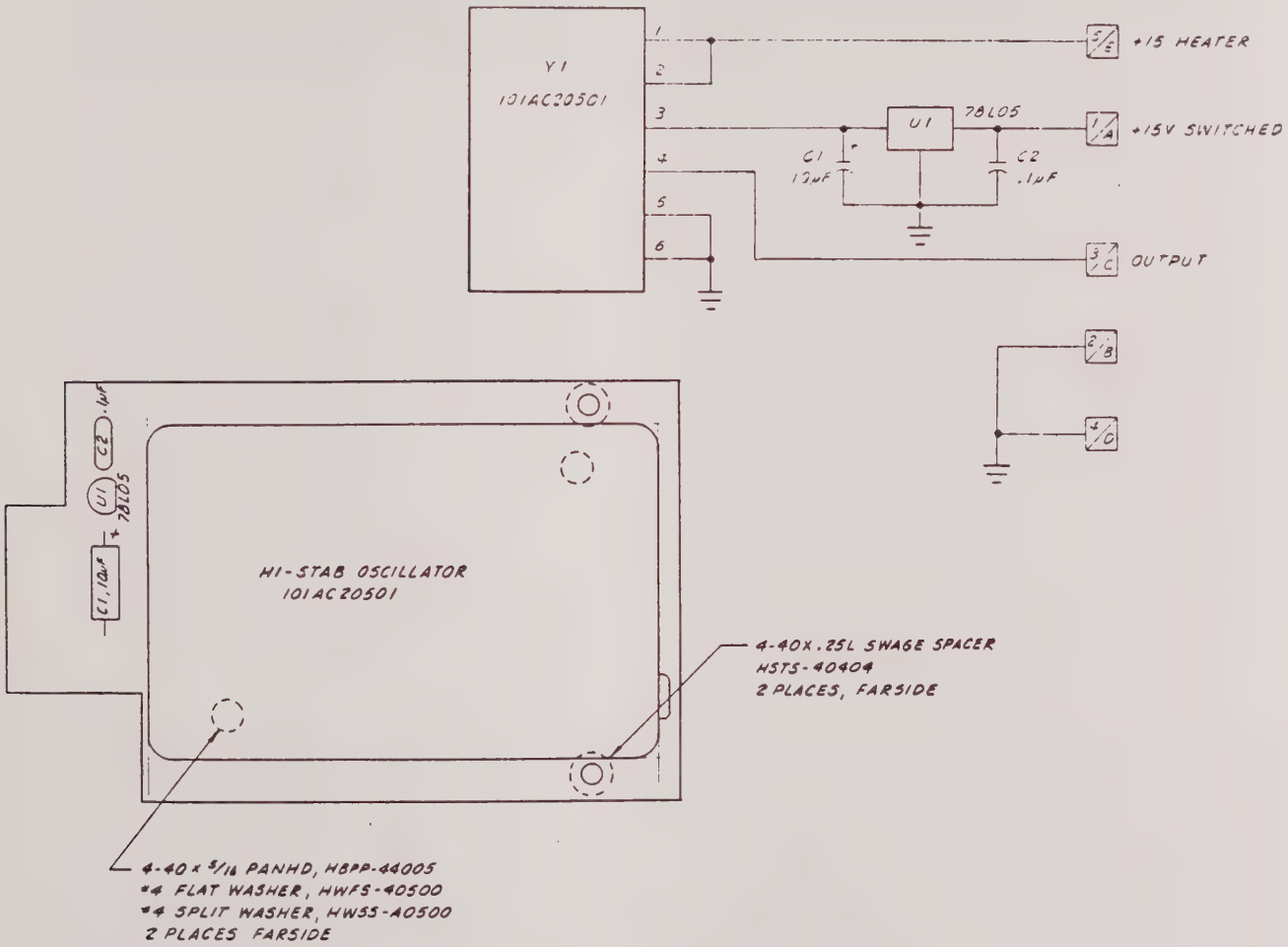
Option 03: 1 kHz Resolution

When this option is installed, the output frequency resolution is 1 kHz. The 100 kHz, 10 kHz and 1 kHz digits may be set by the front panel switches or by a remote control command.

Option 03 requires the installation of two circuits: the Intermediate PLL (A9) and the High Resolution PLL (A10). The parts lists and drawings for these circuits are shown in the manual; they are omitted from instruments without Option 03.

Option 06: HIGH STABILITY TIME BASE

This option replaces the standard 10 MHz timebase with a high stability 10 MHz oscillator having a stability of <1 X 10E-9/day. The A32 PC board is replaced by an alternate version (DWG# 101BA39101). The parts list and drawings for this circuit are shown below.



Parts List for 101BA39101 HI STAB OSC PCA Rev A

	Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	101BF39101	1	58900		HI STAB OSC PCB
	2	101AC20501	1	58900		10 MHZ 1X10©-9 OSC SPEC
C	1	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	2	CT20-06100	1	56289	150D106X9020B2	10 UF 20V TANTALUM
U	1	URPO-78050	1	04713	MC78L05	MC78L05 .1A 5V REG

Option 19: Reverse Power Protection

When this option is installed, a power limiter circuit is placed between the output of the step-attenuator and the RF output connector on the front panel. The limiter prevents excessive reverse power levels at the output connector from reaching the components in the instrument's RF path. An instrument with Option 19 installed will accept, without resulting damage, the following reverse power levels at the RF output connector: 5 W average power, 2 kW peak power (1 usec. pulse, .1% duty factor).

Option 23: Type N Output Connector

When this option is installed, the standard SMA-type RF output connector is replaced with a type "N" connector.

SECTION NINE

SPECIAL CONFIGURATIONS

The instrument for which this manual is supplied contains no special modifications. Consult Section 8 of the manual for information concerning any options which may be identified on the Serial Number tag affixed to the instrument's rear panel.

SECTION TEN

MANUAL CHANGES

MANUAL CHANGES SUPPLEMENT -- Gigatronics Model 605

Manual Print Date: December, 1988
Supplement Print Date: February 23, 1990

This supplement contains important information regarding errors in the manual, and changes made to the instrument after the printing of the manual.

Insructions to use this supplement:
1. Make all ERRATA corrections listed on following page(s).
2. Make all appropriate manual changes as listed by instrument serial numbers below.

Serial #	Manual Changes:	Serial #	Manual Changes:
435001,5002, 5005,5006, 5007,5008, 5009,5011 5012,5017, 5020		435205,5201	1,3,4,15,18,19,20
		435203,5206, 5213,5216	1-4,15,18,19,20
435004	1,2,5	435217	2-4,15,18,19,21
435014, 5015	1,2,3,5	435207,5208, 5209,5215	1-4,15,18,19,21
435010,5013, 5016,5019	1,2,3	435202,5214, 5218,5219, 5220	1-4,15,17,18,19,21
421920	6,7,8,9,10 11,12,13,14	435212	1-4,15,17,18,19
435102 thru 435107	3,4,15	438001-8007, 8009-8011, 8014-8015	1-4,15,18,19,21
435101	2,3,4,15	435210	2-4,15,18,19,21
435108,5110, 5111	2,3,5,15	438008,8012, 8013,8017, 8018,8020	1-4,15,17-19,21
435113,5114, 5117,5119, 5120	3,15,16	435118	1-4,15,17-19,21
433817,3818, 3819,3820	1 thru 4,15, 17 thru 20		
435204	3,4,15,18,19		
435115	1,2,3,15		
435211	3,4,15,18,19,20		

Giga-tronics

MANUAL CHANGE NOTICE

ERRATA

Model 605 Manual, Part# 308AM00400
Print Date: December, 1988

DESCRIPTION

The specification for Amplitude Modulation Rate on page 2-2 should read: "10 Hz to 10 kHz (100 kHz typical, 3 dB points referenced to 1 kHz), any waveform (external), 1 kHz fixed sine (internal)"

Section 3, page 3-4, under paragraph heading **AMPLITUDE MODULATION**; change the third sentence to read as follows:

This board also houses the logic circuits by which the modulation mode is selected under **either local or remote control, as well as the function generator used to produce internal modulation signals.**

Section 4, Model 605 Test Data Sheet, page 4-14, change as follows:

FROM: **4.2.2** Frequency Range

4.2.2.2 UUT is locked and leveled throughout its frequency range. _____

4.2.3 Maximum Output Amplitude

4.2.3.1 Maximum power is within specification throughout frequency range. _____

4.2.4 Output Power Accuracy

4.2.4.1 UUT meets the required power accracy throughout its frequency range (accuracy ±2 dBm, at 0 dBm and -4 dBm) _____

TO: **4.2.3** Frequency Range

4.2.3.1 UUT is locked and leveled throughout its frequency range. _____

4.2.4 Maximum Output Amplitude

4.2.4.1 Maximum power is within specification throughout frequency range. _____

Giga-tronics

MANUAL CHANGE NOTICE

ERRATA

Model 605 Manual, Part# 308AM00400
Print Date: December, 1988

DESCRIPTION

Section 4, Model 605 Test Data Sheet, page 4-14, change as follows: (Continued)

4.2.4.2 UUT meets the required power accracy throughout its _____ frequency range (accuracy ±2 dBm, at 0 dBm and -4 dBm)

Section 6, page 6-025-1, M600 DWNCONV Chassis Assembly, DWG# 304CA11900, Revision B

The Revision B parts list as shown in the manual is changed as follows: Item# 9 is changed to part# 304CA09817 (Typing Error).

Section 4, page 4-16, AM Performance, change as follows:

4.2.13.2 Set the UUT to an output frequency listed in the test data sheet, at +3 dBm (or 7 dB below max rated power), with all modulation off. Center the output signal on the spectrum analyzer, span 200 kHz, top ref level.

Section 2, page 2-2, Amplitude Modulation Characteristics, change as follows:

DEPTH: 0 to 82% (0 to ≤20 dB), measured at +3 dBm (or 7 dB below max rated power)

DISTORTION: ≤10% (5% typ) at 50% depth and 1 kHz rate, measured at ±3 dBm (or 7 dB below max rated power)

Giga-tronics

MANUAL CHANGE NOTICE

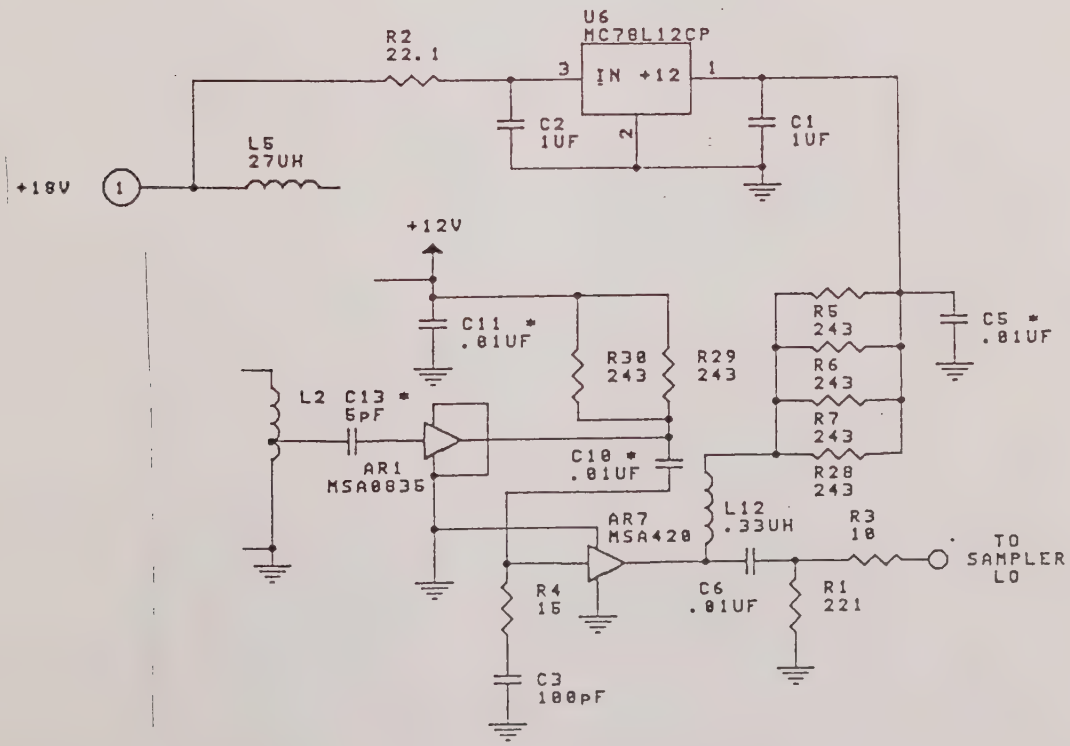
Change Number: 1
Reference: ECO 1749

Model 605 Manual, Part# 308AM00400
Print Date: December 1988

DESCRIPTION

300 MHz Oscillator PC board (A104), DWG# 304CA05500, Revision J

The Revision I parts list and drawings shown in the manual are changed as follows: Add C1 and C2, 1 uF capacitors, part# CC50-05100. Add C3, a 100 pF capacitor, part# CC50-01100. Add L12, a .33 uH inductor, part# LAD0-04330. Add R2, a 22.1 ohm resistor, part# RN55-00221. Add R4, a 15 ohm resistor, RN55-00150. Add R5, R6, R29 and R30, 243 ohm resistors, part# RN55-02430. Add U6 (type: MC78L12), part# URP0-78120. Delete C12. Change AR1 to type MSA-0835, part# MA23-00006. Change AR7 to type MSA-0420, part# MA09-00003. Change C6, C39, C40 and C44 to .01 uF chip, part# CK50-03100. The modified circuit is illustrated below.



Giga-tronics

MANUAL CHANGE NOTICE

Change Number: 2
Reference: ECO 1742

Model 605 Manual, Part# 308AM00400
Print Date: December 1988

DESCRIPTION

Modulation Control PC board (A118), DWG# 308CA00301, Revision J

This is a non-functional change; the Revision I parts list and drawings shown in the manual are not affected.

Giga-tronics

MANUAL CHANGE NOTICE

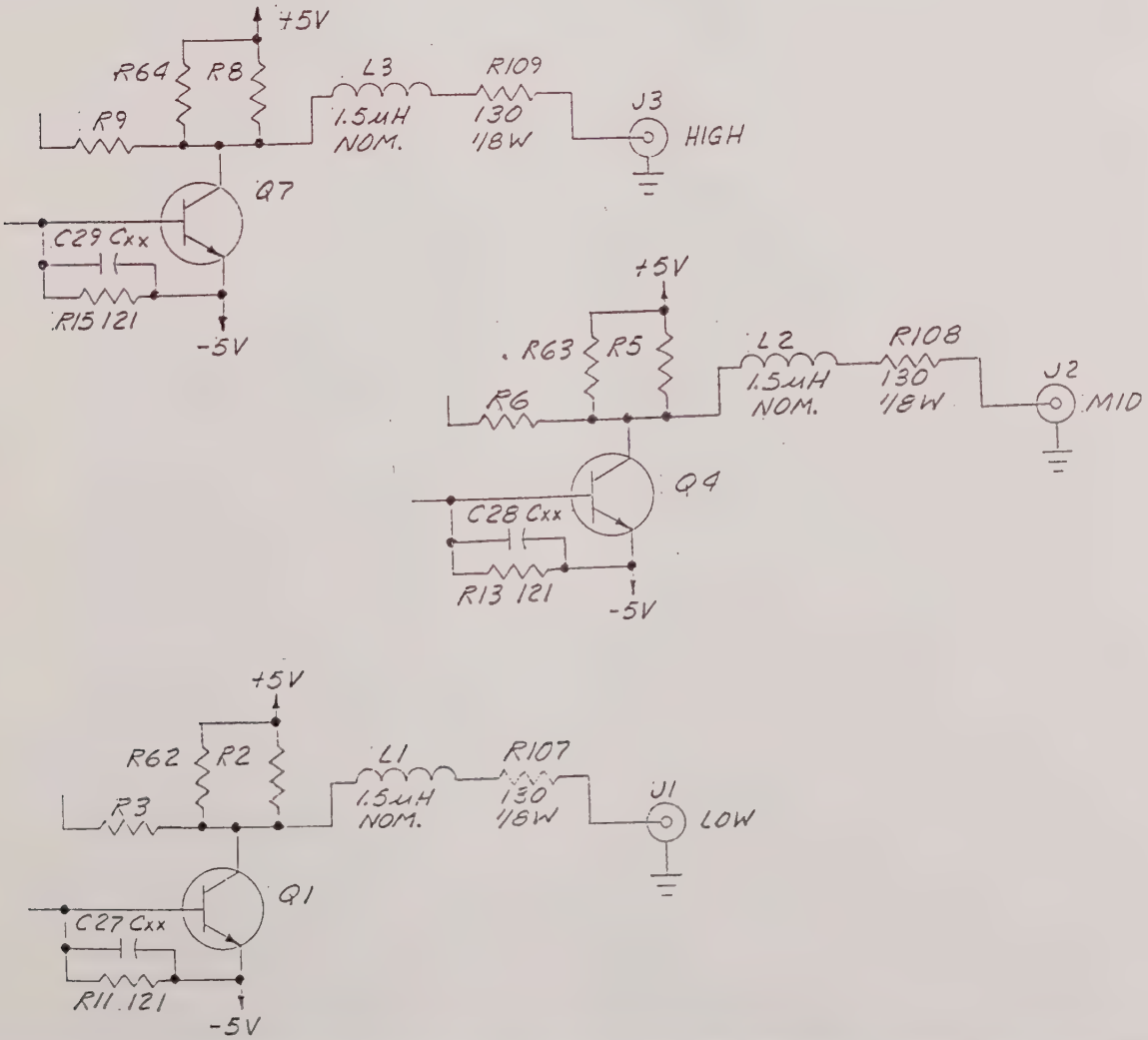
Change Number: 3
Reference: ECO 1782

Model 605 Manual, Part# 308AM00400
Print Date: December 1988

DESCRIPTION

Modulation Control PC board (A118), DWG# 308DA00301, Revision K

The revision J parts list and drawings are changed as follows: C1, C2, C3, R1, R4, and R7 are deleted. R107, R108 and R109 are changed to 130 ohms (part# RC05-01300). C27, C28, and C29 (values indeterminate) are added. L1, L2, and L3 (nominally 1.5 uH, part# LAD0-05150) are added. The modified circuit is illustrated below.



Giga-tronics

MANUAL CHANGE NOTICE

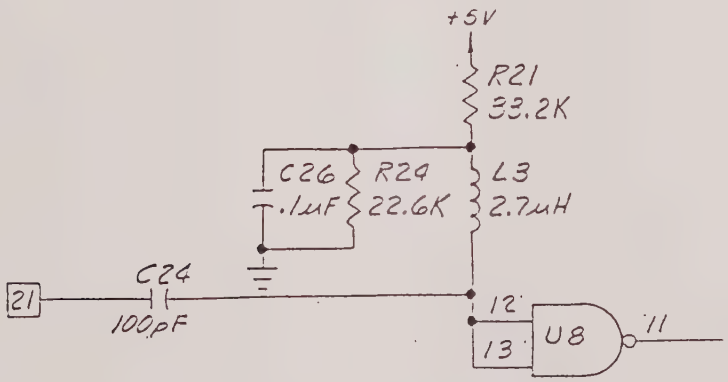
Change Number: 4
Reference: ECO 1767 & 1767A

Model 605 Manual, Part# 308AM00400
Print Date: December, 1988

DESCRIPTION

110 MHz Reference PLL PC board (A12), DWG# 304CA05600, Revision F

The Revision E parts list and drawings shown in the manual are changed as follows: add C26, a .1 uF capacitor, part# CC50-04100. Add L3, a 2.7 uH inductor, part# LAD0-05270. Delete CR4 and CR7. Delete R23. C24 is changed to 100 pF, part# CC50-01100. R21 is changed to 33.2K, part# RN55-23320. R24 is changed to 22.6K, part# RN55-22260. Circuit changes are illustrated below.



Giga-tronics

MANUAL CHANGE NOTICE

Change Number: 15
Reference: ECO 1804

Model 605 Manual, Part# 308AM00400
Print Date: December, 1988

DESCRIPTION

300 MHz OSC PC assembly (A104), DWG# 304CA05500, Revision K.

The Revision J parts list and drawings shown in the manual are changed as follows: C13 is changed to .01 UF, nominal (part# CK50-03100).

Giga-tronics

MANUAL CHANGE NOTICE

Change Number: 17

Model 605 Manual, Part# 308AM00400
Print Date: December, 1988

DESCRIPTION

The High Resolution PC assy (A10), DWG# 304CA03400 has been replaced by an alternative version (DWG# 304CA03410, Revision A). The parts list and drawings are attached.

Parts List for 304CA03410 HI RESOLUTION PCA Rev A

Item		Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	304CF03410	1	58900	304CF03410	HI RESOLUTION PCB
	2	HSTS-40304	4	06540	9532B-A-0440	4-40 X 3/16 SWAGE SPACER
	3	HQH0-00010	2	05820	651-B	IC HEATSINK
	4	304CF09100	1	58900	304CF09100	TOP PC SHEILD 1.25 X 2.5
	5	304BF09200	2	58900	304BF09200	PC BD SHIELD COVER
	6	304CF09500	1	58900	304CF09500	BOTTOM PC BD SHIELD 1.25
	7	ETST-06224	1	88245	1280B	TURRET TERMINAL
	8	304BF04300	1	58900	304BF04300	PC SHIELD CKT SIDE
AR	1	MA19-00001	1	24539	MSA-0135-12	0-250MHZ AMP 19DB 1.5DBM
AR	2	MA19-00001	1	24539	MSA-0135-12	0-250MHZ AMP 19DB 1.5DBM
C	1	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	2	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	3	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	4	CK50-00050	1	96733	SG0805BY5R0DSA	5 PF NPO CHIP
C	5	CC50-00270	1	52763	EDPT-27-NPO-5%	27 PF CERAMIC NPO
C	6	CC50-00270	1	52763	EDPT-27-NPO-5%	27 PF CERAMIC NPO
C	7	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	8	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	10	CK50-03100	1	96733	SG133BX103KS	.01 UF X7R CHIP
C	11	CK50-00050	1	96733	SG0805BY5R0DSA	5 PF NPO CHIP
C	12	CK50-00150	1	96733	SG91BY150JSA	15 PF NPO CHIP
C	13	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	14	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	15	CC50-03470	1	51642	150-100-W5R-473	.047 UF CERAMIC X7R
C	16	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	17	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	18	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C	19	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	20	CE25-R7100	1	00656	AMR101M025	100UF ELECTROLYTIC CAP
C	21	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	22	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	24	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	27	CC50-02470	1	51642	200-100-W5R-472K	.0047 UF CERAMIC X7R
C	28	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	29	CC50-02470	1	51642	200-100-W5R-472K	.0047 UF CERAMIC X7R
C	30	CC50-04100	1	56289	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	31	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	32	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	33	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	34	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	35	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C	37	CC50-02470	1	51642	200-100-W5R-472K	.0047 UF CERAMIC X7R
C	38	CC50-03470	1	51642	150-100-W5R-473	.047 UF CERAMIC X7R
CR	1	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
CR	2	DVA0-00109	1	26629	KV3901	MV109 6-30 PF DIODE
CR	3	DVA0-00109	1	26629	KV3901	MV109 6-30 PF DIODE
CR	4	DSA0-04148	1	07263	1N4148	IN4148 G.P. DIODE
DS	1	ILRR-00125	1	58361	MV5077C	RED LED 1/8" DIA
J	1	JRBM-00000	1	98291	51-045-0000	SMB M BULK MOUNT
L	1	LAD0-04150	1	72259	WEE-.15	.15 UH INDUCTOR

Parts List for 304CA03410 HI RESOLUTION PCA Rev A

Item		Part Number	Qty	FSCM	Mfr's Part Number	Description
L	3	LABO-04100	1	99800	1325-101	.10 UH INDUCTOR
Q	1	QBNS-00090	1	04713	BFR90	BFR 90 15 V 5 GHZ FT
Q	4	QBNS-02222	1	27014	PN2222	PN2222 .5A 30V NPN
Q	5	QBPS-02907	1	27014	PN2907	PN2907 .5A 40V .6W PNP
R	5	RN55-01000	1	81349	RN55D1000F	100 OHMS 1% MET FILM
R	6	RC05-13900	1	01121	BB-392-5	3.9K; 5% 1/8W CARBON
R	7	RN55-21000	1	81349	RN55D1002F	10 K OHMS 1% MET FILM
R	8	RC05-21000	1	01121	BB-103-5	10K; 5% 1/8W CARBON
R	9	RN55-21000	1	81349	RN55D1002F	10 K OHMS 1% MET FILM
R	10	RN55-15620	1	81349	RN55D5621F	5.62 K OHMS 1% MET FILM
R	11	RN55-00562	1	81349	RN55D56R2F	56.2 OHMS 1% MET FILM
R	13	RN55-11000	1	81349	RN55D1001F	1 K OHMS 1% MET FILM
R	15	RN55-00100	1	81349	RN55D10R0F	10 OHMS 1% MET FILM
R	17	RN55-00100	1	81349	RN55D10R0F	10 OHMS 1% MET FILM
R	23	RN55-03920	1	81349	RN55D3920F	392 OHMS 1% MET FILM
R	24	RN55-01300	1	81349	RN55D1300F	130 OHMS 1% MET FILM
R	25	RN55-31000	1	81349	RN55D1003F	100 K OHMS 1% MET FILM
R	26	RN55-32000	1	81349	RN55D2003F	200 K OHMS 1% MET FILM
R	27	RN55-31000	1	81349	RN55D1003F	100 K OHMS 1% MET FILM
R	28	RN55-11000	1	81349	RN55D1001F	1 K OHMS 1% MET FILM
R	29	RN55-21000	1	81349	RN55D1002F	10 K OHMS 1% MET FILM
R	30	RN55-22740	1	81349	RN55D2742F	27.4 K OHMS 1% MET FILM
R	31	RN55-26040	1	81349	RN55D6042F	60.4 K OHMS 1% MET FILM
R	32	RN55-26040	1	81349	RN55D6042F	60.4 K OHMS 1% MET FILM
R	33	RN55-22740	1	81349	RN55D2742F	27.4 K OHMS 1% MET FILM
R	34	RC05-11000	1	01121	BB-102-5	1.0K; 5% 1/8W CARBON
R	35	RC05-11500	1	01121	BB-152-5	1.5K; 5% 1/8W CARBON
R	36	RN55-12210	1	81349	RN55D2211F	2.21 K OHMS 1% MET FILM
R	37	RN55-21690	1	81349	RN55D1692F	16.9 K OHMS 1% MET FILM
R	38	RN55-13920	1	81349	RN55D3921F	3.92 K OHMS 1% MET FILM
R	39	RN55-03920	1	81349	RN55D3920F	392 OHMS 1% MET FILM
R	43	RN55-00511	1	81349	RN55D51R1F	51.1 OHMS 1% MET FILM
R	44	RC05-00510	1	01121	BB510-5	51 OHMS 5% 1/8W CARBON
R	45	RC05-03300	1	01121	BB-331-5	330ohms 5% 1/8W CARBON
RM	1	RM7S-05600	1	71450	750-81-R560	560 OHM X 7 SIP NETWRK
U	2	UINO-08614	1	27014	DS8614	DIVIDE BY 20/21
U	4	MMDC-00001	1	15542	ASK-1	1-600MHZ 600MHZ IF MIX
U	5	UCNO-51460	1	04713	MC145146P	MC145146P FREQ SYNTH
U	7	UONO-00072	1	01295	TL072CP	TL072CP DUAL FET OP AMP
U	8	URPO-78120	1	04713	MC78L12CP	MC78L12CP .1A 12V REG
U	9	UENO-12011	1	04713	MC12011P	MC12011 DIV BY 8/9 600MH
U	10	UENO-10131	1	04713	MC10131P	MC10131P DUAL D F/F
U	11	UENO-10102	1	04713	MC10102P	MC10102P QUAD NOR

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MANUAL CHANGE NOTICE

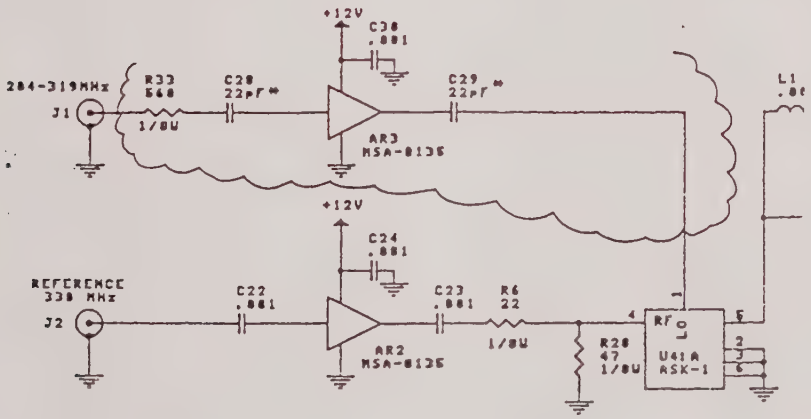
Change Number: 18
Reference: ECO 1803

Model 605 Manual, Part# 308AM00400
Print Date: December, 1988

DESCRIPTION

300 MHz PLL PC assy (A11), DWG# 304CA02200, Rev J

The Rev I parts list and drawings shown in the manual are changed as follows: Add AR3, a 0-250MHZ AMP 19DB 1.5DBM, part# MA19-00001. Add C28 and C29, 22 PF CERAMIC NPO's, part# CC50-00220. Add C30, a .001 UF CERAMIC Y5P, part# CC50-02100. Add R33, a 560 OHM 5% 1/8W CARBON, part# RC05-05600. Circuit changes are illustrated below.



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MANUAL CHANGE NOTICE

Change Number: 19

Model 605 Manual, Part# 308AM00400
Print Date: December, 1988

DESCRIPTION

The Temperature Compensation PC assy (A112), DWG# 304BA04600 has been replaced by an alternative board (DWG# 304BA04601, Revision A). The parts list and drawings are attached.

Parts List for 304BA04601 TEMP COMP PCA Rev A

Item		Part Number	Qty	FSCM	Mfr's Part Number	Description
	1	304BF04601	1	58900	304BF04601	TEMP COMP PCB
	2	ETSB-06216	18	88245594	2000B	BIFURCATED TERMINAL 5/32
	3	HSCS-40304	3	06540	9532B-A-115	#4 X 3/16 SWG CLR SPACER
	4	ETST-06224	1	88245594	1280B	TURRET TERMINAL
	5	HWFN-60500	1	96906	MSXXXXX	#6 X 5/16 NYLON WASHER
C	1	CC50-04100	1	56289591	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	2	CC50-05100	1	56289591	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	3	CC50-04100	1	56289591	2CZ5U104X0050C4	.1 UF CERAMIC Z5U
C	4	CC50-05100	1	56289591	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	5	CT20-R7100	1	90201	TDM107020L6	100UF 20V TANTALUM
C	6	CC50-05100	1	56289591	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C	7	CC50-05100	1	56289591	3CZ5U105X0050C5	1 UF CERAMIC Z5U
CR	1	DSA0-04148	1	07263596	1N4148	IN4148 G.P. DIODE
CR	2	DSA0-04148	1	07263596	1N4148	IN4148 G.P. DIODE
CR	3	DSA0-04148	1	07263596	1N4148	IN4148 G.P. DIODE
J	1	JSP0-10016	1	09922593	DILB16P-108	16 PIN DIP SOCKET
P	1	JHP0-10016	1	51167593	16-600-10	16 PIN DIP HEADER
Q	1	QBNS-02222	1	27014596	PN2222	PN2222 .5A 30V NPN
Q	2	QBPP-05193	1	04713	2N5193	2N5193 4A 40V 40W PNP
R	1	RAPF-22000	1	73138590	66WR20K	20K 10% 20T VERT PC
R	5	RN55-11000	1	81349	RN55D1001F	1 K OHMS 1% MET FILM
R	6	RN55-21000	1	81349	RN55D1002F	10 K OHMS 1% MET FILM
R	7	RN55-21000	1	81349	RN55D1002F	10 K OHMS 1% MET FILM
R	8	RN55-32000	1	81349	RN55D2003F	200 K OHMS 1% MET FILM
R	9	RN55-13160	1	81349	RN55D3161F	3.16 K OHMS 1% MET FILM
R	10	RN55-21000	1	81349	RN55D1002F	10 K OHMS 1% MET FILM
R	11	RN55-21000	1	81349	RN55D1002F	10 K OHMS 1% MET FILM
R	12	RN55-21000	1	81349	RN55D1002F	10 K OHMS 1% MET FILM
R	13	RN55-11000	1	81349	RN55D1001F	1 K OHMS 1% MET FILM
R	14	RN55-31000	1	81349	RN55D1003F	100 K OHMS 1% MET FILM
R	15	RN55-31000	1	81349	RN55D1003F	100 K OHMS 1% MET FILM
R	16	RN55-22370	1	81349	RN55D2372F	23.7 K OHMS 1% MET FILM
R	17	RN55-12210	1	81349	RN55D2211F	2.21 K OHMS 1% MET FILM
R	18	RN55-06810	1	81349	RN55D6810F	681 OHMS 1% MET FILM
R	19	RN55-31000	1	81349	RN55D1003F	100 K OHMS 1% MET FILM
R	20	RN55-06810	1	81349	RN55D6810F	681 OHMS 1% MET FILM
R	21	RN55-06810	1	81349	RN55D6810F	681 OHMS 1% MET FILM
R	22	RN55-06810	1	81349	RN55D6810F	681 OHMS 1% MET FILM
R	23	RN55-06810	1	81349	RN55D6810F	681 OHMS 1% MET FILM
RX	2	RN55-31000	1	81349	RN55D1003F	100 K OHMS 1% MET FILM
RX	3	RN55-31000	1	81349	RN55D1003F	100 K OHMS 1% MET FILM
RX	4	RN55-31000	1	81349	RN55D1003F	100 K OHMS 1% MET FILM
U	1	URP0-79150	1	04713596	MC79L15CP	MC79L15 .1A -15V REG
U	2	URP0-78150	1	04713596	MC78L15CP	MC78L15 .1A 15V REG
U	3	ULP0-00335	1	27014596	LM335Z	TEMP. SENS
U	4	UON0-00074	1	01295596	TL074CN	TL074CN QUAD FET OP AMP
U	5	UON0-00074	1	01295596	TL074CN	TL074CN QUAD FET OP AMP
VR	1	DRAE-00827	1	04713596	1N827	IN827 6.2V REF. DIODE

TEMPERATURE COMPENSATION CIRCUIT -- PC Board A112

This circuit provides correction signals in response to internal temperature changes in the instrument. U3 is a temperature sensor, producing an output voltage proportional to temperature. The sensor voltage, amplified by U4-1, is furnished to two circuits. The circuit consisting of U4-8, Q1 and Q2 controls the speed of the instrument's cooling fan, switching to high speed when the sensor voltage indicates a temperature in excess of +40°C. The circuit consisting of U4-14, cr2, cr3, etc., provides a correction signal to the level control circuit (PC board A5). This correction signal is required because the sensativity of the level detector changes with temperature, and this would cause a level error if not compensated. Each detector has a unique temperature response. During production testing, R2, R3, and R4 are selected and the 'ZERO' pot (R1) is adjusted to match the response curve of the instrument's particular detector. THESE VALUES SHOULD NOT BE CHANGED.

The circuit consisting of U4-7 drives a filter select line in the RF module, in response to a control input.

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MANUAL CHANGE NOTICE

Change Number: 21

Model 605 Manual, Part# 308AM00400
Print Date: December, 1988

DESCRIPTION

The 110 MHz Oscillator/Multiplier PC board (A113), DWG# 304CA05700, has been replaced with revision D. Parts list and drawings are attached.

Parts List for 304CA05700 OSCILLATOR/MULT PCA Rev D

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
1	304CF05700	1	58900	304CF05700	OSCILLATOR/MULT PCB
2	101BF04300	1	58900	101BF04300	SAMPLER IF WALL
3	304BF06300	1	58900	304BF06300	OSCILLATOR/MULT COVER
4	304BF06400	1	58900	304BF06400	OSCILLATOR/MULT BASE
5	304BF06500	1	58900	304BF06500	OSCILLATOR/MULT L. SIDE
6	304BF06600	1	58900	304BF06600	OSCILLATOR/MULT R. SIDE
7	304BF06700	1	58900	304BF06700	OSCILLATOR/MULT END PLAT
8	304BF06800	1	58900	304BF06800	OSCILLATOR/MULT CONN MTG
9	LFT0-83216	4	89110	859617-1	FEED-THRU FILTER 15A
10	JRBM-00000	6	98291	51-045-0000	SMB M BULK MOUNT
12	101BF04601	1	58900	101BF04601	SAMPLER IF SUPPORT,NOTCH
13	304BF05101	1	58900	304BF05101	MODULE WALL
14	304BF05201	1	58900	304BF05201	MODULE SUPPORT
15	HBHS-A2403	1	96906	MIL STD	10-24 X 3/16 SET SCREW
16	HLST-21105	1	79963	341-.093	#2 SOLDER LUG
AR 1	MA19-00001	1	24539	MSA-0135-12	0-250MHZ AMP 19DB 1.5DBM
C 1	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C 2	CC50-00330	1	52763	EDPT-33-NP0-5%	33 PF CERAMIC NP0
C 3	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C 4	CV00-01012	1	18736	EF14	1-14 PF VARIABLE
C 5	CC50-00270	1	52763	EDPT-27-NP0-5%	27 PF CERAMIC NP0
C 6	CC50-00047	1	51642	100-100-C0G-479J	4.7PF CERAMIC NP0
C 7	CC50-00330	1	52763	EDPT-33-NP0-5%	33 PF CERAMIC NP0
C 8	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C 9	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C 10	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C 11	CK50-03100	1	96733	SG133BX103KS	.01 UF X7R CHIP
C 12	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C 13	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
C 14	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C 15	CT20-06100	1	56289	150D106X9020B2	10 UF 20V TANTALUM
C 16	CT20-06100	1	56289	150D106X9020B2	10 UF 20V TANTALUM
C 17	CV00-02011	1	74970	187-0106-005	1.7-11 PF AIR TRIMMER
C 18	CV00-09035	1	59660	538011D 9-35	9-35 PF VARIABLE
C 19	CC50-00100	1	51642	100-100-C0G-100J	10 PF CERAMIC NP0
C 20	CV00-02011	1	74970	187-0106-005	1.7-11 PF AIR TRIMMER
C 21	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C 22	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C 23	CV00-05018	1	59660	538011A 5.5-18	5.5-18 PF VARIABLE
C 25	CV00-05018	1	59660	538011A 5.5-18	5.5-18 PF VARIABLE
C 26	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C 27	CV00-05018	1	59660	538011A 5.5-18	5.5-18 PF VARIABLE
C 28	CC50-05100	1	56289	3CZ5U105X0050C5	1 UF CERAMIC Z5U
C 29	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C 30	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C 31	CC50-02100	1	52763	EDPT-1000-Y5P10%	.001 UF CERAMIC Y5P
C 33	CC50-?????	1	51642	150-100-C0G-???J	SELECTED IN TEST
C 34	CT20-06100	1	56289	150D106X9020B2	10 UF 20V TANTALUM
C 35	CC50-03100	1	51642	150-100-W5R-103K	.01 UF CERAMIC X7R
CR 1	DSA0-02810	1	28480	5082-2810	5082-2810 SCHOT. DIODE

Parts List for 304CA05700 OSCILLATOR/MULT PCA Rev D

Item	Part Number	Qty	FSCM	Mfr's Part Number	Description
CR 2	DVA0-00109	1	26629	KV3901	MV109 6-30 PF DIODE
L 2	LAB0-03820	1	99800	1026-14	.082uH INDUCTOR
L 3	LR00-00000	1	58900	LR00-00000	HAND WOUND COIL
L 4	LR00-00000	1	58900	LR00-00000	HAND WOUND COIL
L 5	LR00-00000	1	58900	LR00-00000	HAND WOUND COIL
L 6	LAD0-04150	1	72259	WEE-.15	.15 UH INDUCTOR
L 7	LR00-00000	1	58900	LR00-00000	HAND WOUND COIL
L 8	LR00-00000	1	58900	LR00-00000	HAND WOUND COIL
Q 1	QBNS-06304	1	04713	2N6304	2N6304 15V 1400MHZ NPN
R 1	RN55-31000	1	81349	RN55D1003F	100 K OHMS 1% MET FILM
R 2	RN55-14750	1	81349	RN55D4751F	4.75 K OHMS 1% MET FILM
R 3	RN55-21000	1	81349	RN55D1002F	10 K OHMS 1% MET FILM
R 4	RN55-05620	1	81349	RN55D5620F	562 OHMS 1% MET FILM
R 5	RN55-00562	1	81349	RN55D56R2F	56.2 OHMS 1% MET FILM
R 6	RN55-05620	1	81349	RN55D5620F	562 OHMS 1% MET FILM
R 7	RN55-05620	1	81349	RN55D5620F	562 OHMS 1% MET FILM
R 8	RN55-03320	1	81349	RN55D3320F	332 OHMS 1% MET FILM
R 9	RN55-03320	1	81349	RN55D3320F	332 OHMS 1% MET FILM
R 10	RN55-03320	1	81349	RN55D3320F	332 OHMS 1% MET FILM
R 11	RN55-05620	1	81349	RN55D5620F	562 OHMS 1% MET FILM
R 12	RN55-08250	1	81349	RN55D8250F	825 OHMS 1% MET FILM
R 13	RN55-08250	1	81349	RN55D8250F	825 OHMS 1% MET FILM
R 14	RN55-08250	1	81349	RN55D8250F	825 OHMS 1% MET FILM
R 15	RN55-03320	1	81349	RN55D3320F	332 OHMS 1% MET FILM
R 16	RN55-03320	1	81349	RN55D3320F	332 OHMS 1% MET FILM
R 17	RN55-03320	1	81349	RN55D3320F	332 OHMS 1% MET FILM
R 18	RN55-03320	1	81349	RN55D3320F	332 OHMS 1% MET FILM
R 20	RN55-03320	1	81349	RN55D3320F	332 OHMS 1% MET FILM
U 1	UEN0-10216	1	04713	MC10216P	MC10216P TRIPLE RCVR
U 2	UEN1-10107	1	04713	MC10H107P	MC10H107P TRI OR/NOR
U 3	URP0-78120	1	04713	MC78L12CP	MC78L12CP .1A 12V REG
U 4	URC0-07815	1	04713	MC7815CT	MC7815CT 1A 15V REG
U 5	UEN0-10216	1	04713	MC10216P	MC10216P TRIPLE RCVR
U 6	UEN0-10216	1	04713	MC10216P	MC10216P TRIPLE RCVR
U 7	UEN0-10216	1	04713	MC10216P	MC10216P TRIPLE RCVR
Y 1	Y180-11000	1	00809	C189-1	110MHZ 5TH OVTN XTAL
YH 1	Y18H-00150	1	12020	PCL1-43-15-60	15V HC18 XTAL OVEN